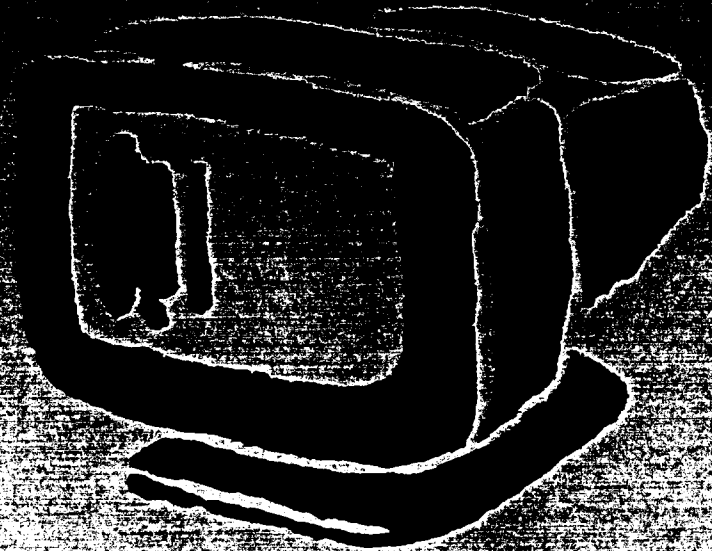
TAXAN



Service Manual

Ergovision 740 LR
&
Ergovision 740 TCO

suitable selection of H-SYNC and V-SYNC control lines, it does this when ever a mode change occurs. A mode change is detected by either a change in vertical frequency, which is monitored by firmware, or by a sudden change in horizontal frequency.

When power is disturbed to the unit, the power reset line goes low. This also causes an input to the micro via the MODEC line. On detecting this interrupt, the micro first checks inputs Pin 4 of IC801. If these are also low, then it knows the MODEC interrupt was caused by an impending power failure. In this case the micro saves the current RAM data in EEROM and prepares for power off. The RESET line is delayed for 7ms by R801, ZD801, R803 and C801 to allow time for the data to be saved. The REST line then holds off the micro and the EEROM until power is good once more.

Notes

Section 4.
Setup Adjustments

4.1. Preparing the Display for Adjustment 4-1
4.2. Adjustment Procedures 4-1
4.3. High Voltage Verification 4-2
4.4. G1 Voltage Adjustment 4-2
4.5. Background Brightness Setting 4-2
4.6. Screen Brightness Adjust 4-3
4.7. Magnetic Field Configuration 4-3
4.8. Raster Center Verification 4-3
4.9. Tilt Verification 4-3
4.10. Focus Verification 4-3
4.11. Color Misconvergence 4-3
4.12. Primary Test Mode 4-3
4.13. Performance Adjustments for All Preset Mode 4-3
4.14. Image Performance Verifications 4-4
4.15. Uniformity Verification 4-4
4.16. Brightness Verification 4-4
4.17. Display Size Stability 4-4
4.18. Color Purity Verification 4-4
4.19. Video Noise 4-4
4.20. Power Saving Check 4-4
4.21. DDC 1/2 Data Wirting 4-5

4.1. Preparing the Display for Adjustment

Before adjusting any the display settings or making final adjustments after service, perform the following pre-test settings to prepare the display for adjustment:

1. Be sure to allow the display to warm up for at least 30 minutes before making any adjustments.
2. When making tests and adjustments, the CRT should be facing east or west to minimize the affect of the earth's magnetic field.
3. Set the contrast control at 80% and the brightness control at 50% for all tests unless otherwise specified.
4. Thoroughly degauss the entire screen with a manual degausser before proceeding with tests.
5. All test should be performed with the rated power supply voltage unless otherwise specified.

4.1.1. Test Equipment Required

The following equipment will be required to make the tests and adjustments detailed in this section:

- ☐ Video signal and pattern generator
- ☐ Digital multimeter
- ☐ Degausser

4.2. Adjustment Procedures

4.2.1. Adjustment Sequence

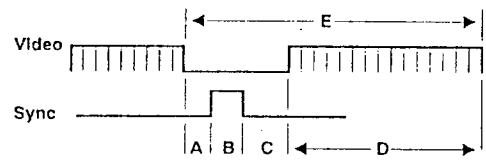
This display undergoes an automatic alignement procedure during manufacture. This alignment procedure follows a fixed sequence of adjustments which are duplicated in this section. When making manual adjustments during service, you should always make the adjustments in the order given here to ensure correct results.

4.2.2. Preset Timings Used During Adjustment

During alignment it is necessary to input certian preset timings stored in the display. The detailed parameters of all the preset timings are given in the table below for your reference.

IMPORTANT NOTE

The preset timings for different versions of this model may differ from those shown here. Be sure to check the list of preset timings for the unit being serviced.



Mode Number	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7
Data Pixel	1280	1024	1024	1024	800	800	800
Data Line	1024	768	768	768	600	600	600
H. Freq.(kHz)	79.976	68.677	60.023	58.230	53.674	48.044	46.875
V. Freq(Hz)	75.025	84.997	75.029	72.245	85.061	72.140	75.000
Pixel Rate(MHz)	135.000	94.500	78.750	75.000	56.250	50.350	49.500
Hor. FP μs(A)	0.119	0.508	0.203	0.320	0.569	1.112	0.323
Hor. Sync μs(B)	1.067	1.016	1.219	1.813	1.138	2.383	1.616
Hor. BP μs(C)	1.837	2.201	2.235	1.387	2.702	1.430	3.232
Hor. Active μs(D)	9.481	10.836	13.003	13.653	14.222	15.889	16.162
Hor. Total μs(E)	12.504	14.561	16.660	17.173	18.631	20.815	21.333
Ver. FP ms(A)	0.013	0.015	0.017	0.052	0.019	0.770	0.021
Ver. Sync ms(B)	0.038	0.044	0.050	0.103	0.056	0.125	0.064
Ver. BP ms(C)	0.475	0.524	0.466	0.498	0.503	0.479	0.448
Ver. Active ms(D)	12.804	11.183	12.795	13.189	11.179	12.489	12.800
Ver. Total ms(E)	13.329	11.765	13.328	13.842	11.756	13.863	13.333
Polarity(H.V)	+,+	+,+	+,+	-,-	+,+	+,+	+,+
Primary mode is 60.023kHz / 75.029Hz (1024x768)							

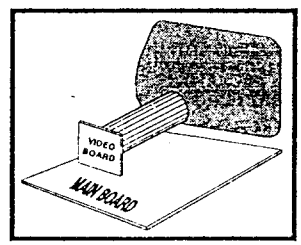
Table 4-1-1 Table of preset Timing Parameters

Mode Number	Mode 8	Mode 9	Mode 10	Mode 11	Mode 12	Mode 13
Data Pixel	640	640	640	640	640	640
Data Line	480	480	480	480	400	350
H. Freq.(kHz)	43.269	37.736	37.500	31.469	31.469	31.469
V. Freq(Hz)	85.008	72.570	75.000	59.942	70.080	70.080
Pixel Rate(MHz)	36.000	32.000	31.500	25.175	25.175	25.175
Hor. FP μs(A)	1.556	0.750	0.508	0.635	0.635	0.635
Hor. Sync μs(B)	1.556	1.250	2.032	3.813	3.813	3.813
Hor. BP μs(C)	2.222	4.500	3.810	1.907	1.907	1.907
Hor. Active μs(D)	17.778	20.000	20.317	25.417	25.417	25.417
Hor. Total μs(E)	23.111	26.500	26.667	31.777	31.777	31.777
Ver. FP ms(A)	0.023	0.239	0.027	0.318	0.381	1.176
Ver. Sync ms(B)	0.069	0.080	0.080	0.064	0.064	0.064
Ver. BP ms(C)	0.578	0.742	0.427	1.049	1.112	1.907
Ver. Active ms(D)	11.093	12.720	12.800	15.253	12.711	11.122
Ver. Total ms(E)	11.764	13.780	13.333	16.683	14.269	14.269
Polarity(H.V)	-,-	-,-	-,-	-,-	-,+	+,-
Primary mode is 60.023kHz / 75.029Hz (1024x768)						

Table 4-1-2 Table of preset Timing parameters

IMPORTANT NOTE

The adjustment settings in this section are based on REVISION G of the factory alignment procedures. Appendices detailing changes in the factory alignment procedures that have occurred since publication of this service manual are available upon request.



Location of PCBs

Initial settings to be carried out manually prior to automatic alignment:

4.3. High Voltage Verification

1. Input a cross hatch pattern in primary mode and adjust VR101 on the main board (see figure 4-1 for approximate location) so the high voltage is in the range 26kV±0.1.
2. Input a full white pattern in 31.47kHz (640×480) mode. Check that the high voltage is in the range 26kV±0.3.

4.4. G1 Voltage Adjustment

Input a raster pattern (video OFF) in primary mode and push the external brightness control buttorn to maximum. Adjust VR102 so that the voltage of G1 read on a digital multimeter is -35V±1 with HITACHI CRT (with TOSHIBA CRT is -45V±1).

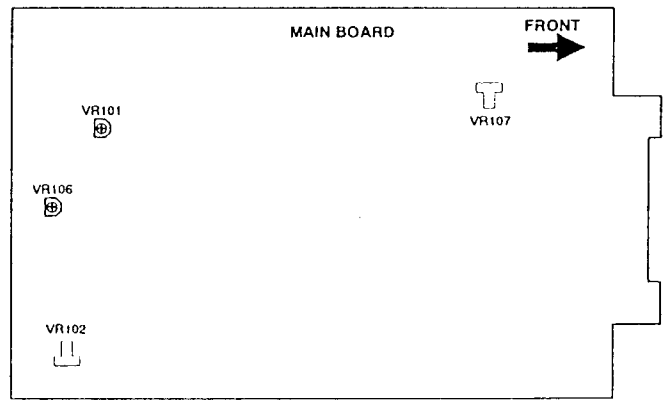


Figure 4-1 Location of on Mainboard

Steps used in white balance adjustment:

4.5. Background Brightness Setting

1. Input a raster pattern in primary mode and push the external brightness control button to maximum. Adjust the SCREEN VR so background brightness is approximately 1.5FL±0.1.

2. Before carrying out white balance adjustment, make sure that the display size and linearity are in spec.
3. Before carrying out white balance adjustment, make sure that the VR106 position shall be turn counterclockwise to the end (ABL no action).
4. Before carrying out white balance adjustment, make sure that the internal contrast VR107 shall be turn to the center position.
5. Input timing in primary mode, and the white balance automatic adjust some item as blow.

   (a) Input no video pattern in primary mode, and set-up brightness of raster white balance get the x,y value is x=0.346±0.01 y=0.359±0.01.

   (b) Input a full white pattern in primary mode, and set-up 5000 degrees kelvin of picture white balance get the x,y value is x=0.346±0.01 y=0.359±0.01.

   (c) Input a full white pattern in primary mode, and set-up 6500 degrees kelvin of picture white balance get the x,y value is x=0.313±0.01 y=0.329±0.01.

   (d) Input a full white pattern in primary mode, and set-up 9300 degrees kelvin of picture white balance get the x,y value is x=0.283±0.01 y=0.298±0.01.

4.6. Screen Brightness Adjustment

1. Input a raster pattern in primary mode. Set external brightness key to maximum and external contrast key to minimum, then make sure that the raster brightness range is 1FL±0.3. If not in this range, adjust screen VR of F.B.T.
2. Input a raster pattern in primary mode. Set external contrast key to maximum and push external brightness key to brightness is 0.08FL, then adjust internal contrast VR107 and check that brightness at the center of the screen is in the range 33FL±1.
3. Input a full white pattern in primary mode. Set external brightness and contrast key to maximum and adjust VR106 and check that brightness at the center of the screen is in the range 36FL±1.

Conclusion White Balance Adjustment:

4.7. Magnetic Field Configuration

Configure the magnetic field as follows:

- ☐ Northern hemisphere : H=0.01, V=0.45
- ☐ Southern hemisphere : H=0.01, V=-0.52

4.8. Raster Center Verification

Input a cross hatch pattern in 79.976kHz (1280x1024) mode, and check raster center shall be less than 3mm (|L-R|≤3mm). If not in this ranged and select SW301 for adjustment raster center.

4.9. Tilt Verification

Input a cross hatch pattern in primary mode and use the tilt rotation key to ensure that tilt is less than 1mm.

4.10. Focus Verification

1. Input a full white pattern in primary mode. Use the external brightness control to adjust background brightness so it is not visible and set external contrast so the brightness is 30FL. Switch to a display of cross hatch pattern.
2. Adjust the FBT focus VR1 and VR2 so the vertical line and horizontal line are as clear as possible.
3. Input a "o" characters pattern in primary mode and check "o" characters is clearest.

4.11. Color Misconvergence

1. Input a full white pattern in primary mode and adjust external brightness so there is no background brightness and external contrast so the screen brightness is 30FL.
2. Switch to a cross hatch pattern and verify that misconvergence in a circle measured from the center of the screen (Area A) is not greater than 0.3mm, and for all areas outside Area A is not greater than 0.4mm.

Automatic camera alignment procedure:

The procedures listed below are those carried out using the automatic Camera Alignment System (CAS). These adjustments cannot be made manually but must be performed using the CAS software provided by the manufacturer.

4.12. Primary Test Mode Performance Adjustments

1. H. RASTER CENTERING
   Raster area centered horizontally in the bezel.
2. V. RASTER CENTERING
   Raster area centered vertically in the bezel.
3. ROTATION (TILT)
   Raster area aligned with bezel.

4.13. Performance Adjustments for All Preset Modes

1. H. POSITION
   Centers the picture display horizontally in the bezel area |L-R|≤1mm.
2. H. SIZE,
   Configures picture display width as 300±3mm.

3. **V. POSITION**
   Centers the picture display vertically in the bezel area |T-B| ≤1mm.
4. **V. SIZE**
   Configures picture display height as 225±3mm.
5. **V. Linearity**
   Configures vertical linearity as less than 8%.
6. **Rotation**
   Configures picture display rotation as less than 1mm.
7. **Pin-Balance**
   Sets left and right pin-balance distortion to less than 1.5mm.
8. **PINCUSHION**
   Sets left and right pincushion distortion to less than 1.5mm.
9. **Trapezium**
   Sets upper and lower trapezium distortion to less than 1.5mm.
10. **Parallelogram**
    Sets parallelogram distortion to less than 1.5mm.

Conclusion of automatic alignment:

4.14. Image Performance Verification

Input each of the preset timings and check that the following specifications are met:

1. **Horizontal Position**
   |L-R| ≤3mm
2. **Horizontal Size**
   300±3mm
3. **Vertical Position**
   |T-B| ≤3mm
4. **Vertical Size**
   225±3mm
5. **Horizontal Linearity**
   H≤10% (10 x 8 cross hatch pattern)
   This calculation is based on the following formula:

$$\frac{Max - Min}{Max} \times 100\% \leq 10\%$$

6. **Vertical Linearity**
   V≤8.0% (10x8 cross hatch pattern).

$$\frac{Max - Min}{Max} \times 100\% \leq 8\%$$

7. **Geometric Edge Distortion**
   All geometrics distortion shall be less than as below:
   Horizontal line ≤2.5mm
   Vertical line ≤2mm
8. **Recall Button Function**
   Adjust H/V phase and size at random using the external controls and press the recall button. Check that the image performance has returned to be in spec, which will indicate the recall button is functioning correctly.

4.15. Uniformity Verification

Input a 2" square pattern in primary mode, set contrast to maximum and check that there is no overshoot. Check that the brightness in the four corners of the screen is not less than 70% of that in the center of the screen.

4.16. Brightness Verification

1. Input a raster pattern (no video pattern) in primary mode. Adjust external brightness to 0.08FL.
2. Input a full white pattern and adjust external contrast to maximum then check that brightness at the center of the screen shall be more than 30FL. Adjust external brightness to maximum and check that brightness at the center of the screen is 39FL±3.

4.17. Display Size Stability

Inputer a full white pattern in primary mode, set external brightness at 5FL and measure the display size. Adjust the brightness to 30FL and remeasure the display size. The differences should be less than 0.8mm.

4.18. Color Purity Verification

1. Input a full white pattern in primary mode and adjust external brightness so there is no background brightness and adjust external contrast to 25FL. Make a visual check of color purity as follows:

   a)Input the red (R) signal only; no green (G) or blue (B) should be visible.

   b)Input the G signal only; no R or B should be visible.

   c)Input the B signal only; no R or G should be visible.

4.19. Video Noise

Input a cross hatch pattern or full white pattern in primary mode and make a visual check from a distance of 48.3cm (19 inches) for any video noise or other on-screen interference.

4.20. Power Saving Check

1. Input cross hatch pattern in primary mode.
2. Turn OFF H-Sync signal, the power indicator LED have to change the emitting color from green to orange, then turn ON H-Sync signal again, the picture shall be visible.
3. Turn OFF V-Sync signal, the power indicator LED have to change the emitting color from green to orange, then turn ON V-Sync signal again, the picture shall be visible.
4. Turn OFF H/V-Sync signal, the power indicator LED have to change the emitting color from green to orange,

then turn ON H/V-Sync signal again, the picture shall be visible.

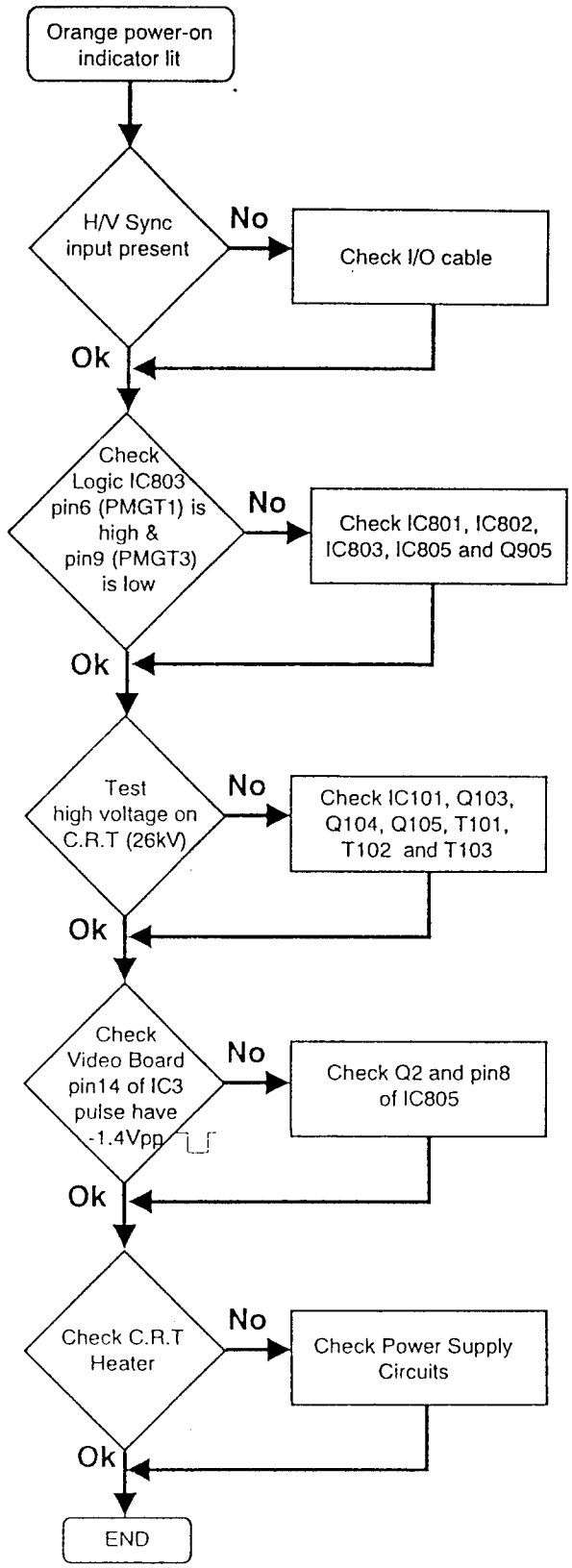
4.21. DDC 1/2 Data Writing

Writing the DDC 1/2 data in EEROM.

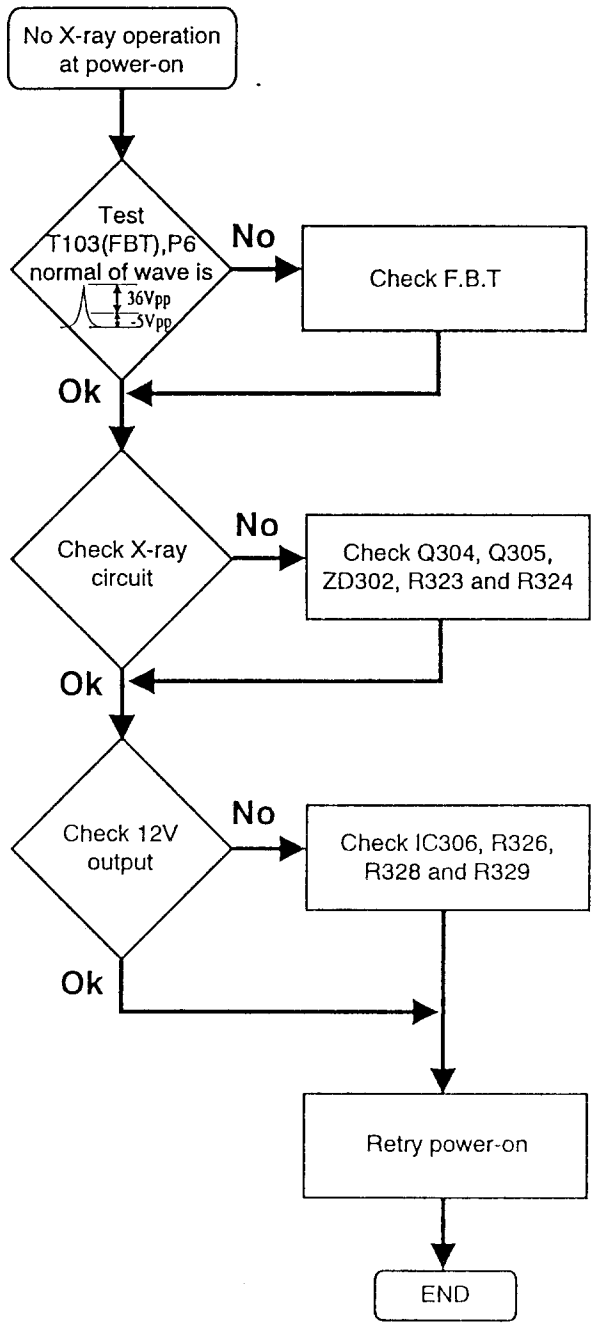
Section 5.
Troubleshooting

5.1. No Display at Power-on 5-1
5.2. No X-ray Operation 5-2
5.3. No Video Operation 5-3
5.4. Poor Vertical Linearity 5-4
5.5. Poor Horizontal Linearity 5-5
5.6. Poor Uniformity 5-6
5.7. Tilted Display Area 5-7
5.8. Misconvergence 5-8
5.9. Poor Regulation 5-9
5.10. Poor Focus 5-10
5.11. Poor Geometry Distortion 5-11

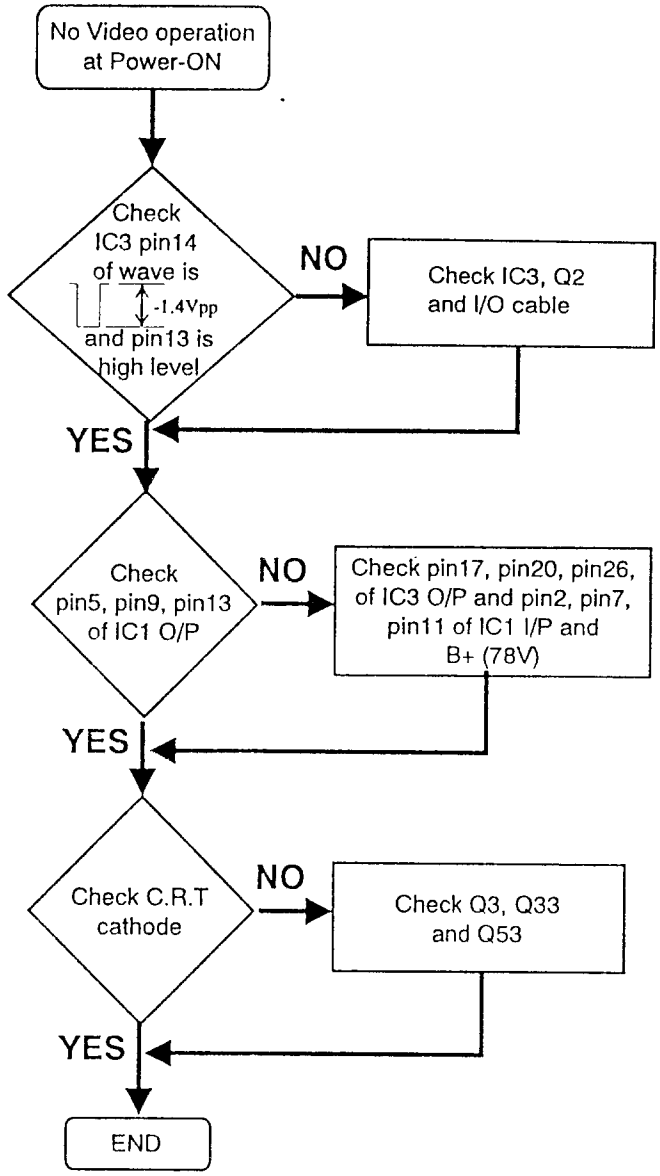
5.1. No Display at Power-on



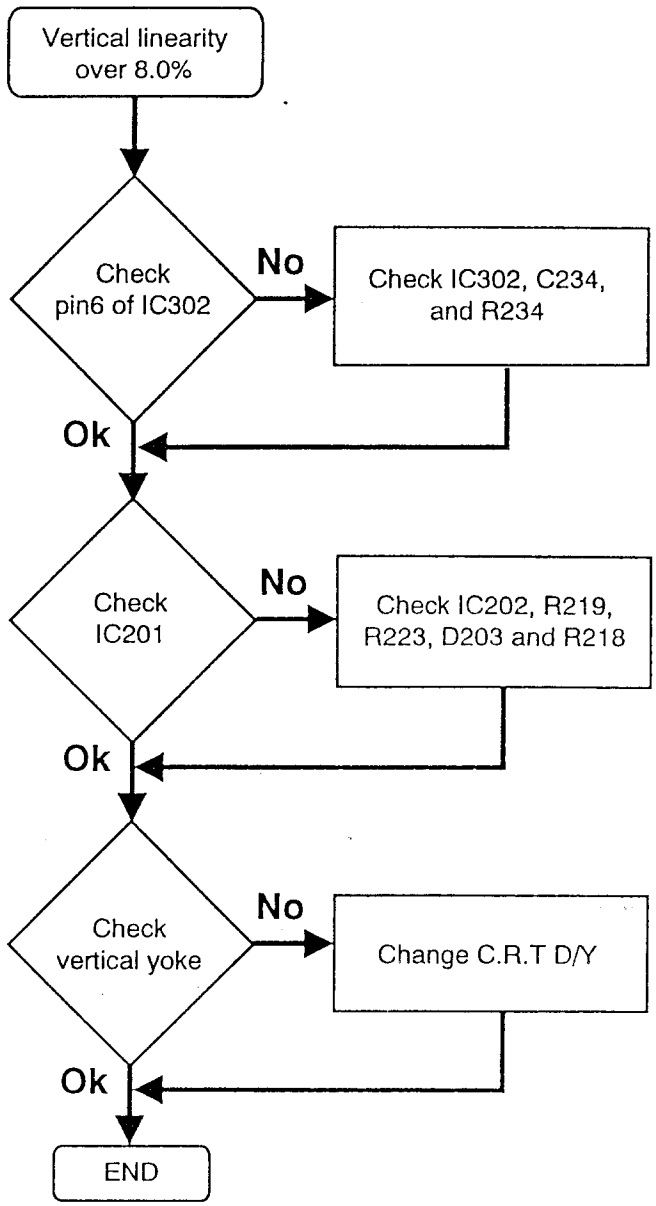
5.2. No X-ray Operation



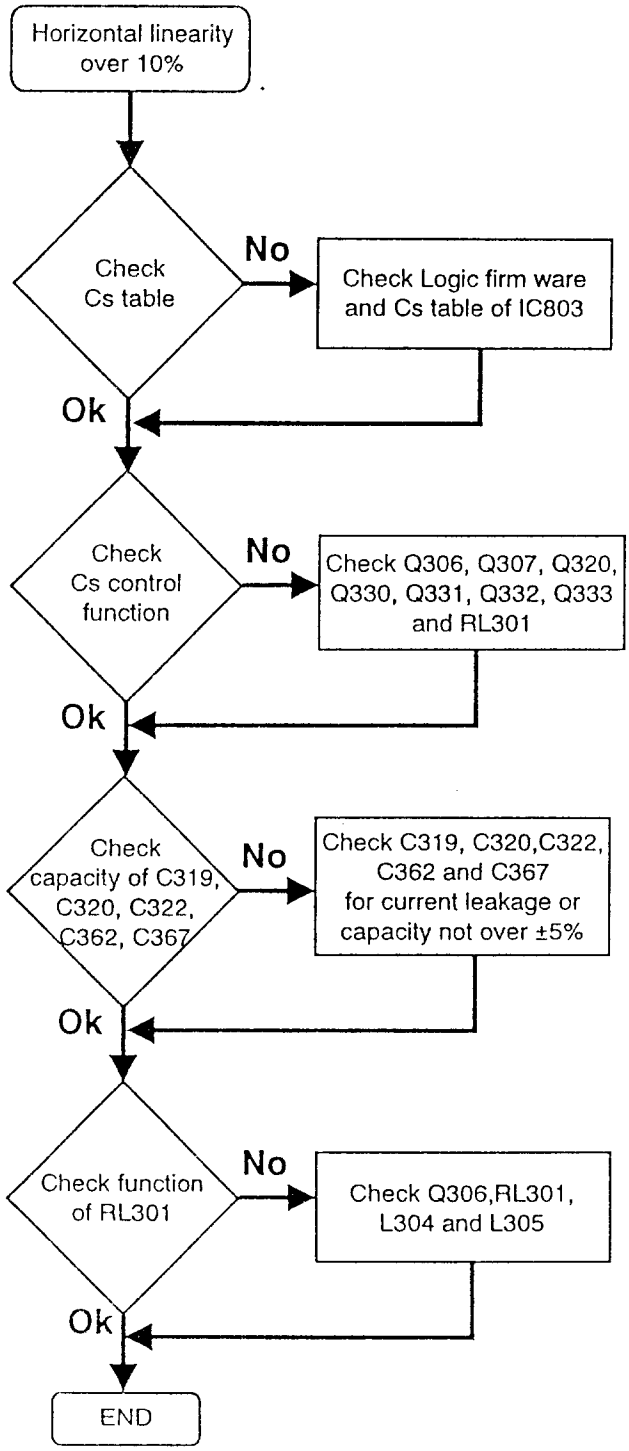
5.3. No Video Operation



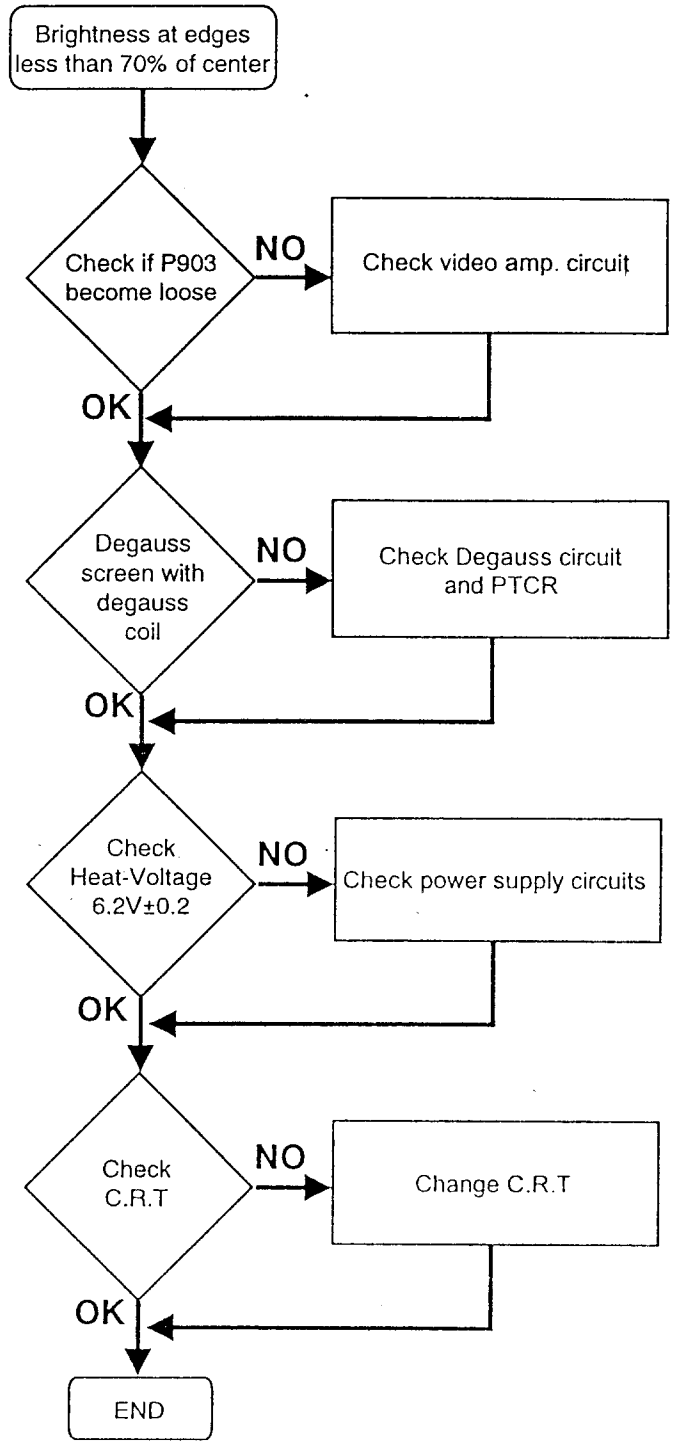
5.4. Poor Vertical Linearity



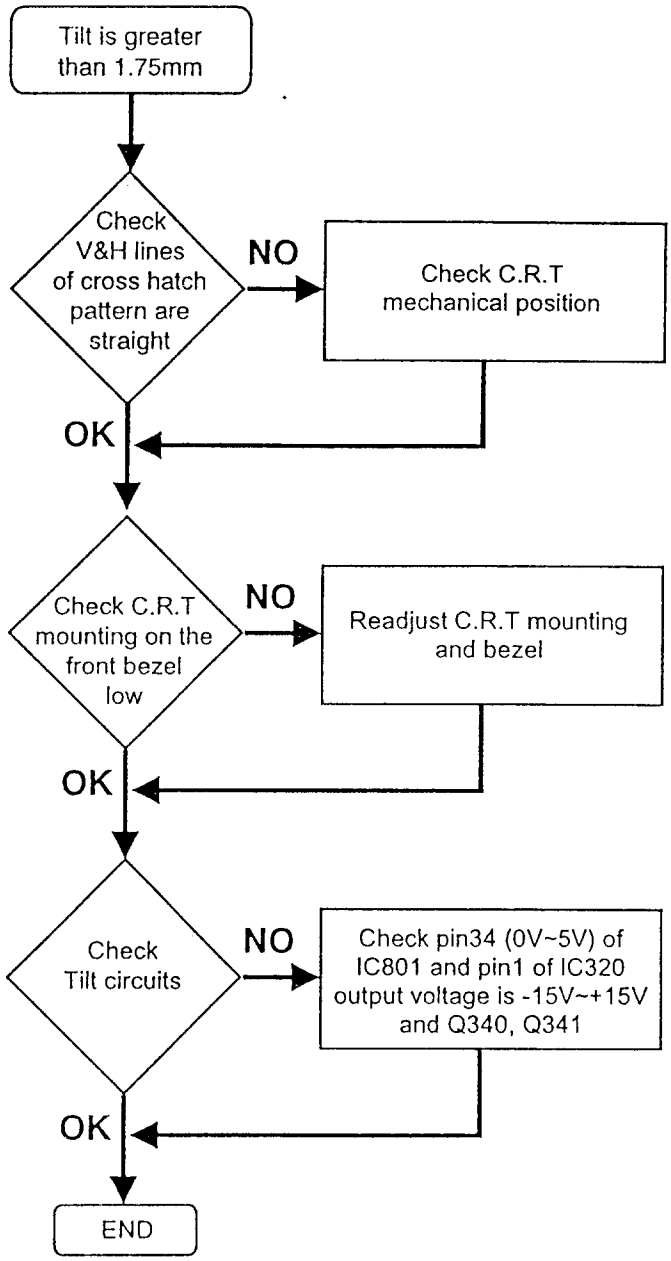
5.5. Poor Horizontal Linearity



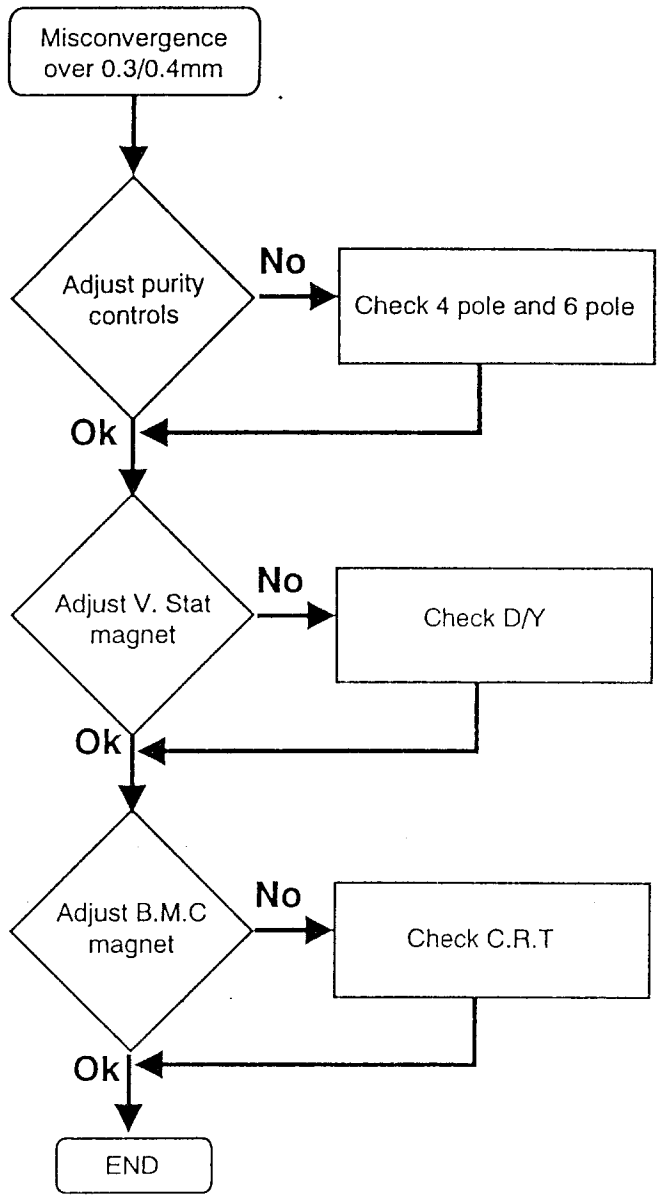
5.6. Poor Uniformity



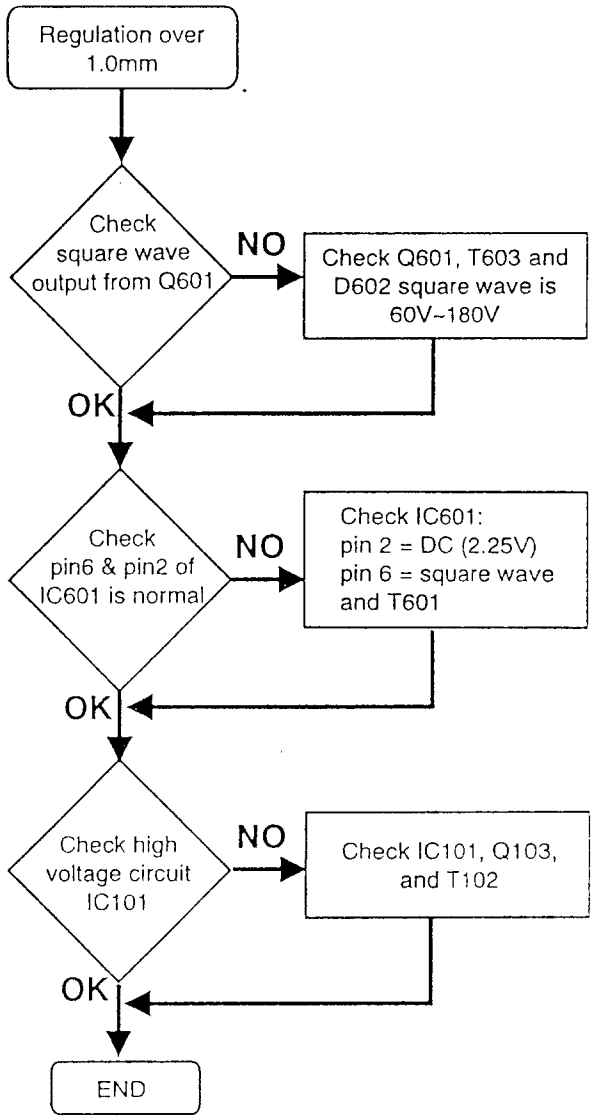
5.7. Tilted Display Area


Tilt is greater than 1.75mm
Check V&H lines of cross hatch pattern are straight
NO
Check C.R.T mechanical position
OK
Check C.R.T mounting on the front bezel low
NO
Readjust C.R.T mounting and bezel
OK
Check Tilt circuits
NO
Check pin34 (0V~5V) of IC801 and pin1 of IC320 output voltage is -15V~+15V and Q340, Q341
OK
END

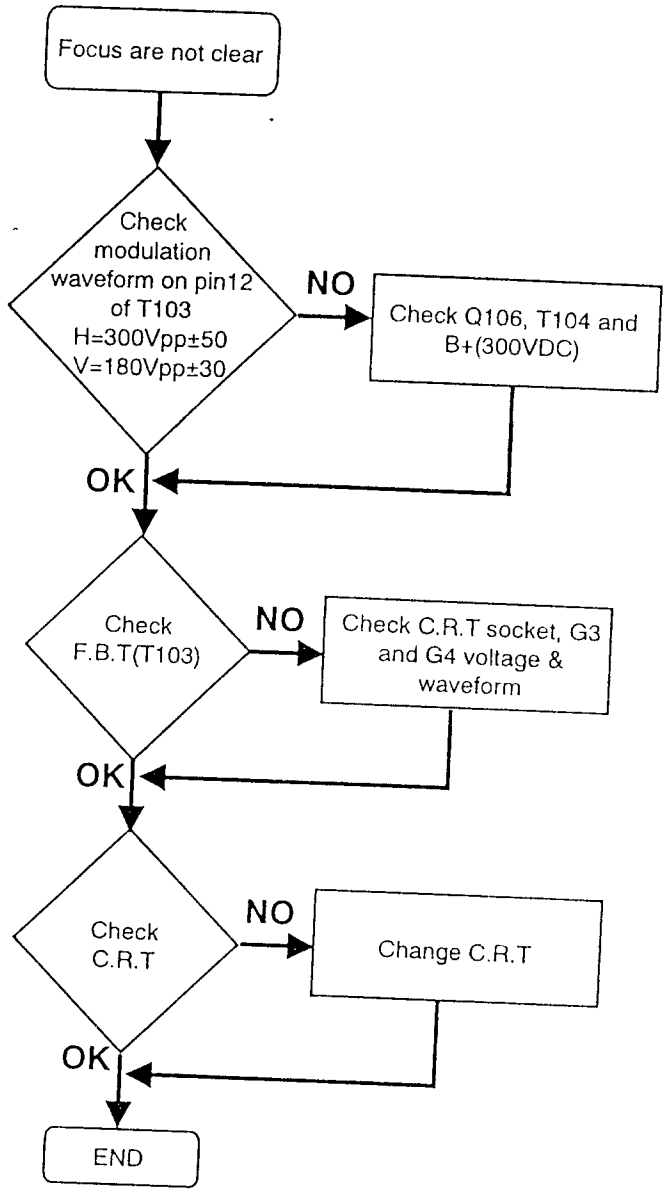
5.8. Misconvergence



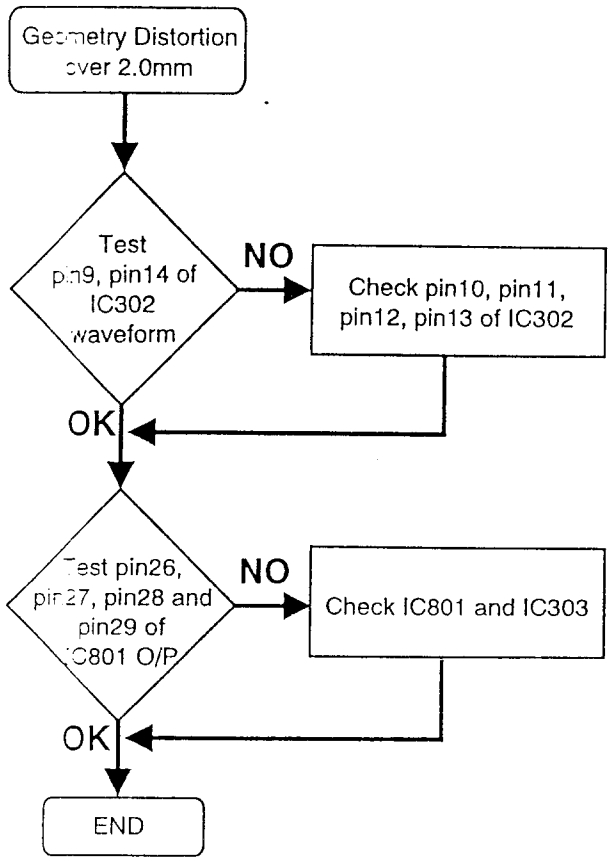
5.9. Poor Regulation


Regulation over 1.0mm
Check square wave output from Q601
NO
Check Q601, T603 and D602 square wave is 60V~180V
OK
Check pin6 & pin2 of IC601 is normal
NO
Check IC601: pin 2 = DC (2.25V) pin 6 = square wave and T601
OK
Check high voltage circuit IC101
NO
Check IC101, Q103, and T102
OK
END

5.10. Poor Focus



5.11. Poor Geometry Distortion



Section 6.

Printed Circuit Boards

6.1. Neck Board 6-1
6.2. Main Board 6-2
6.3. Control Board 6-3
6.4. PCB Wiring Connection 6-3

6.1. Neck Board

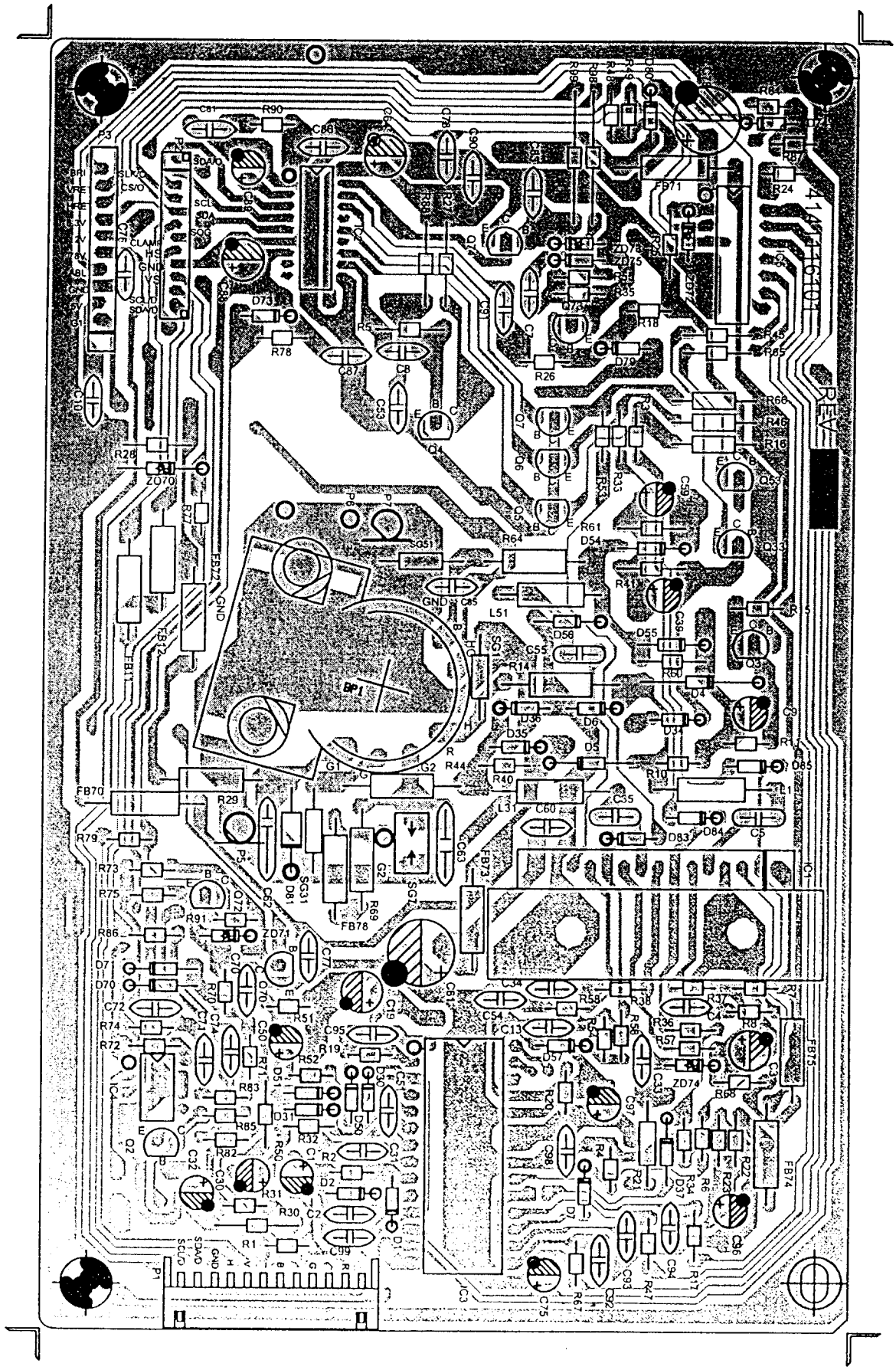


Figure 6-1 Neck Board (Solder Side)

6.2. Main Board

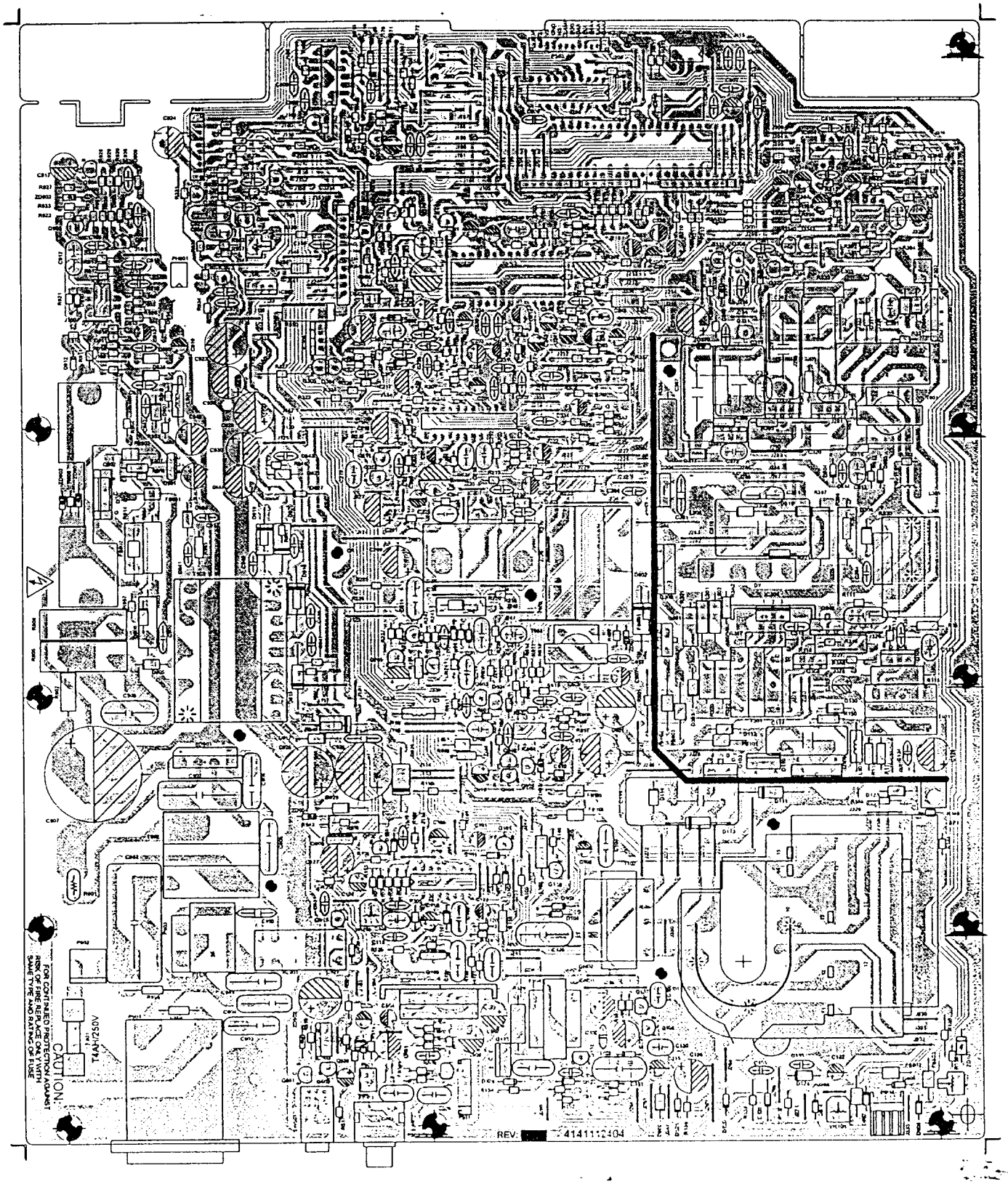


Figure 6-2 Main Board (Solder Side)

6.3. Control Board

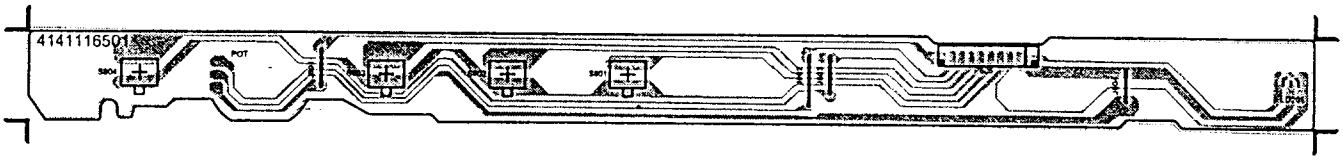


Figure 6-3 Control Board (Solder Side)

6.4. PCB Wiring Connection

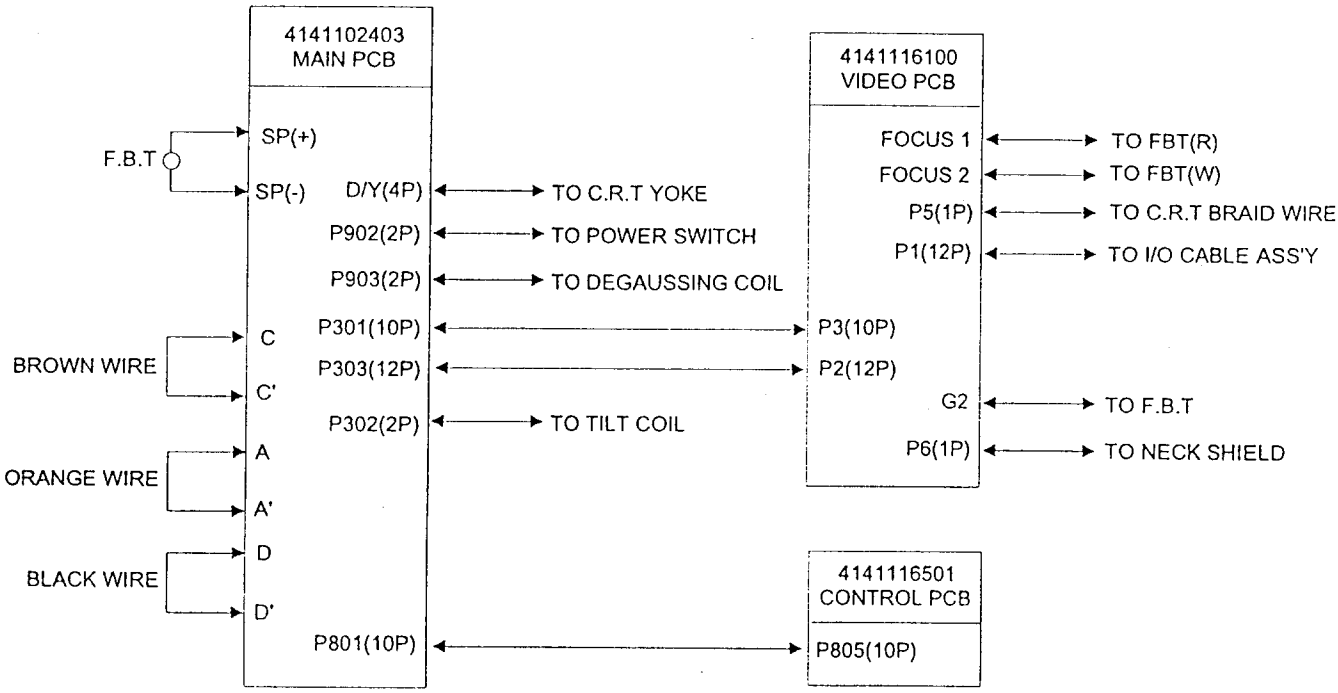


Figure 6-4 PCB Wiring Connection

Section 7.
Schematic Diagrams

7.1. Video Circuit Diagram 7-1
7.2. Deflection & S/P/S & Logic Circuit Diagram 7-1

7.1. Video Circuit Diagram

Please refer to the attached circuit diagram.

7.2. Deflection & S/P/S & Logic Circuit Diagram

Please refer to the attached circuit diagram.

Section 8.
Mechanical Parts

8.1. Key to Exploded View 8-1
8.2. Exploded View. 8-2

8.1. Key to Exploded View

REF.	PART NO.	DESCRIPTION
1	8026113008	SCREW B/HD M3X8 TAPPING "B" FOR BEZEL & UBKT X4
2	366230SR4S	NYLON RIVET SR-4S FOR BEZEL & U BKT
3	1301027F19	BEZEL
4	1376017F10	BEZEL BRACKET
5	7010027817	CRT M41KKL180X11 (UQ)
6	3100452015	RUBBER WASHER 4.5¢X20¢X1.5T FOR CRT & BEZEL X4
7	3111502016	FLAT WASHER M5 T=1.6 FOR CRT & BEZEL X4
8	8135115025	SCREW CAP HI-LOW TAPPING M5X25 FOR CRT & BEZEL
9	C460670110	TILT RING WIRE ASS'Y 270mm FOR P302
10	C001137H11	CRT BRAID WIRE ASS'Y
11	7020177F10	DEGAUSSING COIL 120 TURN FOR P903
12	RH7H100144-V	MAIN PCB ASS'Y
13	8127113006	SCREW PAN(+)/HD CAP TAPPING M3 FOR U BKT & MAIN PCB X7,U BKT & TOP SHIELD X4
14	2001097H10	U BRACKET (I/O CABLE)
15	3011100030	NUT ISO HEX M3 ZINC FOR AC LINE FILTER
16	9004097H11	DECO PLATE
17	2017094030	GROUND CLAMP FOR I/O CABLE
18	8121114008	SCREW CAP BID(+) M4X8 TAPPING * FOR CHASSIS BTM I/O GND
19	C7107H1010	I/O CABLE ASS'Y W/DDC
20	2007197H10	NECK COVER (F)
21	8026113010	SCREW BIND(+) TAPPING M3X10 TR FOR VIDEO SHIELD(FRONT) & H/S ASS'Y
22	7067F20122	LINE FILTER IX-0342-P
23	8504113010	SCREW BIND(+) M3X10 MACH W/DIS FOR FILTER & U BKT X2
24	RH7H100244-V	NECK PCB ASS'Y
25	2009197H10	NECK SHIELD
26	2008097H10	NECK COVER (B)
27	9010097G10	UL SPONGE 80X70X80
28	365230CQ25	PLASTIC SUPPORT CQ-25 FOR TOP SHIELD
29	2012197H10	TOP SHIELD
30	5530200102	CORD CRAMPER TH-A
31	2013297H10	#REAR SHIELD
32	1302027F10	BUCKET
33	8059113522	SCREW BIND(+) B-2 M3.5X22 TAPP FOR BEZEL & BUCKET
34	3011100040	NUT M4 ZN3C FOR BASE & RETAINER
35	3111401210	WASHER FLAT #8O D=12 T=1 ZINC FOR BASE & RETAINER
36	2002094383	WASHER SPRING WAVE FOR BASE & RETAINER
37	1AI00C7F10	RETAINER
38	1704027F10	#TILT BALL
39	1010094310	FOOT
40	1705027F10	#BASE
41	8004114025	SCREW BIND (+) ZINC M4X25 FOR BASE & RETAINER
42	13A7027H11	POWER KNOB
43	2011097H10	#POWER SPRING
44	1321027H11	#CONTROL PANEL
45	13AM027H11	PIANO KEY B
46	13AL027H11	PIANO KEY A
47	13A6027H11	ROTARY KNOB
48	RH7H110444-V	CONTROL PCB ASS'Y
49	8418113010	SCREW BIND(+) TAPPING M3X10 ZI FOR CONT. PANEL & PCB X4,CONT PANEL & SW BKT X2

Other parts list

REF.	PART NO.	DESCRIPTION
	1410004E10	#LENS
	1B550C7H10	PUSH BAR
	463110001N	AC POWER CORD PC VDE GRY 5FT W
	5541025095	CABLE TIE 2.5X90
	5541025160	CABLE TIE-BINDING 2.5X160 FOR P301,303,505 & I/O CABLE
	555040S057	MISTIK TAPE 40mm FOR TOO MYLAR
	8127113006	SCREW PAN(+)/HD CAP TAPPING M3 FOR VIDEO SHIELD & FBT COVER
	9007097H11	NAME PLATE FOR BEZEL
	9012097H11	MANUAL
	C4597H1010	GND WIRE ASS'Y FROM REAR PANNEL TO VIDEO SHIELD & TOP SHIELD

8.2. Exploded View

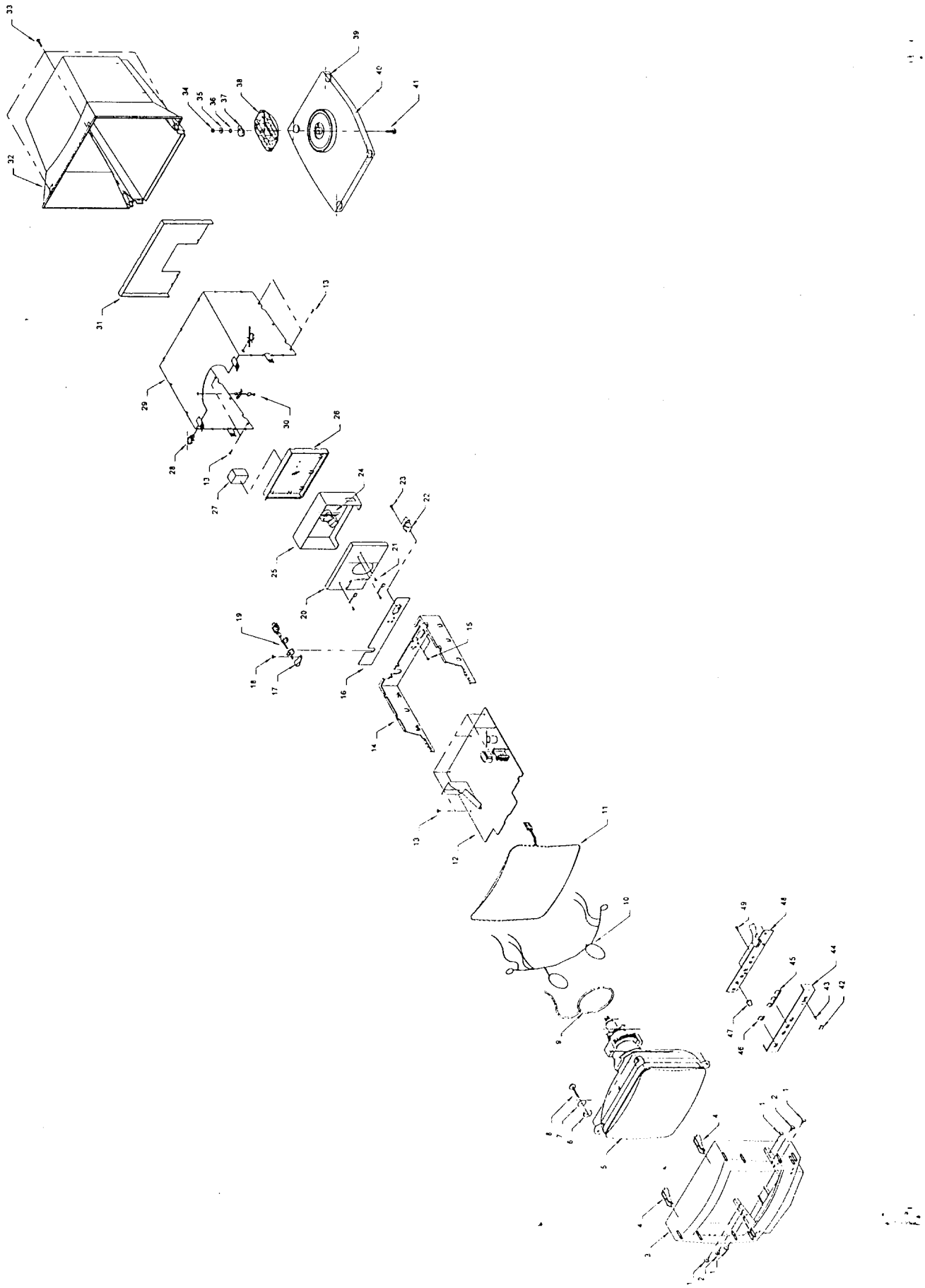


Figure 8-1 Exploded View

Notes

Section 9.
PCB Component List

9.1. Explanation of Parts Listing. 9-1
9.2. Main Board 9-1
9.3. Neck Board 9-7
9.4. Control Board 9-9
9.5. HITACHI CRT Different List 9-9
9.6. TOSHIBA CRT Different List. 9-9

9.1. Explanation of Parts Listing

This section contains a complete listing of the components used on the printed circuit boards contained in the system. For a listing of the mechanical parts, please refer to Section 8., Mechanical Parts.

The list of parts in this section is separated by PCB, and the order of the listing is based on the location reference (REF.) printed on the circuit board and shown in the schematics. Components without a reference location are listed at the beginning of each table in order of the part number, and the location reference of the part with which they are connected is given in the description.

For example:

	2003097301	HEAT SINK FOR Q1

shows Part No. 2003097301, which is connected or related to the components with a location reference of Q1.

Shaded items indicate comonents that are critical for safety or are of proprietary design and must be replaced with parts of the exact same specification or ordered directly from the manufacturer.

For example:

Q1	4101515070	TRS. MOSFET 2SK1507 TO-220

Indicates that the TRS. MOSFET, Part No. 4101515070 located at reference Q1, should onlybe replaced with the exact same part ordered from the manufacturer.

9.2. Main Board

REF.	PART NO.	DESCRIPTION
	RH7H100144 -V	MAIN PCB ASS'Y
	1003090000	NYLON BUSHING FOR (IRF740, IRF840, STP10NA40)
	2001097H10	#U BRACKET (I/O CABLE)
	2004097H10	#HEAT SINK A FOR FBT COVER
	2004191630	HEAT SINK HOLDER FOR Q902 (FS10KM-12)
	2005097H10	#FBT COVER FOR MAIN PCB
	2006097H11	#SWITCH BRACKET
	2008094660	HEAT SINK FOR Q902
	2009197H10	#NECK SHIELD
	2016097H10	#DIODE HOLDER
	2017097H10	#HEAT SINK FOR IC201
	2046294000	HEAT SINK F FOR IC304
	2046294000	HEAT SINK F FOR IC306
	3011100030	NUT ISO HEX M3 Z1NC FOR AC LINE FILTER
	3052000300	EYELET FOR FBT X3,T903 X2,L304 X2
	3340230165	BEAD PIN 16.5X2.3¢ FOR R901
	36523BS19P	SPACER SUPPORT CBS-19P FOR MAIN PCB
	4141112404	#P.C.B. MAIN
	4692300001	CLIP-FUSE 5MM FOR F901
	5290005000	TUBE-SHRINK ID=5¢ FOR SW901
	5324100600	WIRE UL1007 #24 BLK 50-K-K FOR D-D'
	5324113200	WIRE UL1007 #24 BRN 310-K-K FOR A-A'
	5326111701	WIRE 1007 #26 BRN 160-5-5 FOR C-C'
	5520100004	INSULATOR SI-RUBBER TO-220 (W/ FOR(IRF740,IRF840,STP10NA40)
	5520100005	INSULATOR SI-RUBBER TO-3P FOR Q303
	5530200102	CORD CRAMPER TH-A FOR CR
	5541025095	CABLE TIE 2.5X90 FOR G2,FOCUS & CORE FIXED
	5560080003	CORE-FE 2643665802 FOR G2, FOCUS WIRE
	8026113006	SCREW B/HD M3X6 TAPPING "B" FOR PCB & Q902 HEAT SINK
	8026113008	SCREW B/HD M3X8 TAPPING "B" FOR HEAT SINK & FBT COVER X2
	8026113008	SCREW B/HD M3X8 TAPPING "B" FOR PCB & FBT COVER X1,AUDIO & BRACKET ASS'Y X1
	8026113010	SCREW BIND(+) TAPPING M3X10 TR FOR IC201
	8026113010	SCREW BIND(+) TAPPING M3X10 TR FOR PCB & FBT ASS'Y
	8026153008	SCREW B/HD M3X8 TAPPING "B" FOR PCB & FBT COVER X1
	8127113006	SCREW PAN(+)/HD CAP TAPPING M3 FOR U BKT & MAIN PCB X7,U BKT & TOP SHIELD X4
	8504113006	SCREW BID(+) M3X6 MACH W/DISK FOR POWER SWITCH & SW BKT
	8504113008	SCREW BIND(+) M3X8 MACH W/DISK FOR IC304
	8504113008	SCREW BIND(+) M3X8 MACH W/DISK FOR IC306
	8504113010	SCREW BIND(+) M3X10 MACH W/DIS FOR D304,Q103,105,303,601
	8504113010	SCREW BIND(+) M3X10 MACH W/DIS FOR FILTER & U BKT X2
	8504113016	SCREW BID(+) MACH W/D ZINC M3X FOR Q902(FS10KM-12)
	9011097310	LABEL FOR FIRMWARE FOR IC801
	9011294230	LABEL 28KV
	C488031217	CONN. 3P & WIRE ASS'Y 400mm FOR P902
BD901	4130400080	DIODE BRIDGE 4A/800V P:5.0MM
C101	5156339T50	CAP-EC6 3.3UFM 50V -RT-
C102	5074223101	CAP-MEF 0.022UFK 100V -SF-
C103	5156339T50	CAP-EC6 3.3UFM 50V -RT-
C104	5074104101	CAP-MEF 0.1UFK 100V -SF-
C105	5116104111	CAP-MC 0.1UFK 100V -RT-
C106	5128101552	CAP-CCSL 100PFJ 50V -RT-
C107	5156101T25	CAP-EC6 100UFM 25V -RT-
C108	5156101T25	CAP-EC6 100UFM 25V -RT-
C109	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C110	5156100T50	CAP-EC6 10UFM 50V -RT-
C112	5156101T16	CAP-EC6 100UFM 16V -RT-
C113	5128101552	CAP-CCSL 100PFJ 50V -RT-
C114	51901825A3	CAP-MPP 0.0018UFJ 2KV P:15MM -
C115	5190334583	CAP-MPP 0.33UFJ 250V -SF-
C116	5156220S03	CAP-EC6 22UFM 250V -SF-
C119	5113224111	CAP-MC 0.22UFK 100V -SF-
C120	5092562565	CAP-PP 0.0056UFJ 630V P:10MM -
C121	5156331T16	CAP-EC6 330UFM 16V -RT-
C122	5162229T50	CAP-NPEC 2.2UFM 50V -RT-
C125	5074123104	CAP-MEF 0.012UFK 400V P:10mm -
C128	515X100S03	CAP-ECX 10UFM 250V -SF-
C130	5116104111	CAP-MC 0.1UFK 100V -RT-
C131	5074104104	CAP-MEF 0.1UFK 400V P:15MM -SF
C132	5156229T50	CAP-EC6 2.2UFM 50V -RT-
C134	5101102132	CAP-CCB 1000PFK 1KV -RT-

REF	PART NO.	DESCRIPTION
C135	5116102111	CAP-MC 0.001UFK 100V -RT-
C136	5156331T16	CAP-EC6 330UFM 16V -RT-
C150	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C151	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C152	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C155	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C201	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C202	5156100T16	CAP-EC6 10UFM 16V -RT-
C203	5156101T16	CAP-EC6 100UFM 16V -RT-
C204	5156479T50	CAP-EC6 4.7UFM 50V -RT-
C205	5156109T50	CAP-EC6 1UFM 50V -RT-
C206	5156100T16	CAP-EC6 10UFM 16V -RT-
C207	5156100T16	CAP-EC6 10UFM 16V -RT-
C208	5156479T50	CAP-EC6 4.7UFM 50V -RT-
C209	515X471S25	CAP-ECX 470UFM 25V -SF-
C210	515X221S35	CAP-ECX 220UFM 35V -SF-
C211	515X471S25	CAP-ECX 470UFM 25V -SF-
C212	5113224111	CAP-MC 0.22UFK 100V -SF-
C213	5116332111	CAP-MC 0.0033UFK 100V -RT-
C214	5113224111	CAP-MC 0.22UFK 100V -SF-
C215	5074104102	CAP-MEF 0.1UFK 250V -SF-
C216	515X471S16	CAP-ECX 470UFM 16V -SF-
C217	515X101T16	CAP-ECX 100UFM 16V -RT-
C218	5074474505	CAP-MP 0.47UFJ 50V P:5.0MM
C220	5116222111	CAP-MC 0.0022UFK 100V -RT-
C221	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C222	5128821552	CAP-CCSL 820PFJ 50V -RT-
C223	5128331552	CAP-CCSL 330PFJ 50V -RT-
C224	5156109T50	CAP-EC6 1UFM 50V -RT-
C225	5116333111	CAP-MC 0.033UFK 100V -RT-
C226	5156229T50	CAP-EC6 2.2UFM 50V -RT-
C230	5101102152	CAP-CCB 1000PFK 50V -RT-
C231	5116122111	CAP-MC 0.0012UFM 100V -RT-
C232	5116104111	CAP-MC 0.1UFK 100V -RT-
C234	5156100T16	CAP-EC6 10UFM 16V -RT-
C235	5156331T16	CAP-EC6 330UFM 16V -RT-
C301	5156471T16	CAP-EC6 470UFM 16V -RT-
C302	5156102S16	CAP-EC6 1000UFM 16V -SF-
C303	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C304	5156109T50	CAP-EC6 1UFM 50V -RT-
C307	5116222111	CAP-MC 0.0022UFK 100V -RT-
C308	5156101T16	CAP-EC6 100UFM 16V -RT-
C309	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C310	5156221S16	CAP-EC6 220UFM 16V -SF-
C311	5116102111	CAP-MC 0.001UFK 100V -RT-
C312	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C313	5156221T25	CAP-EC6 220UFM 25V -RT-
C314	5156470T16	CAP-EC6 47UFM 16V -RT-
C315	5156470T50	CAP-EC6 47UFM 50V -RT-
C316	5195432573	CAP-MPP 4300PFJ 1600V P:22.5mm
C319	5195274543	CAP-PMHA 0.27UFJ 400V -SF-
C320	5190724583	CAP-MPP 0.72UFJ 250V -SF-
C321	5074104102	CAP-MEF 0.1UFK 250V -SF-
C322	5190224543	CAP-MPP 0.22UFJ 400V P:22.5MM
C324	5113474111	CAP-MC 0.47UFK 100V -SF-
C325	5156101T25	CAP-EC6 100UFM 25V -RT-
C330	5101103152	CAP-CCB 0.01UFK 50V -RT-
C332	5156100T16	CAP-EC6 10UFM 16V -RT-
C333	5156100T16	CAP-EC6 10UFM 16V -RT-
C334	5134104452	CAP-SCF 0.1UFZ 50V -RT-

REF	PART NO.	DESCRIPTION
C335	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C336	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C338	5156100T16	CAP-EC6 10UFM 16V -RT-
C339	5156100T16	CAP-EC6 10UFM 16V -RT-
C340	5156109T50	CAP-EC6 1UFM 50V -RT-
C341	5156100T16	CAP-EC6 10UFM 16V -RT-
C343	5156109T50	CAP-EC6 1UFM 50V -RT-
C344	5116472111	CAP-MC 0.0047UFK 100V -RT-
C345	5116104111	CAP-MC 0.1UFK 100V -RT-
C346	5074474505	CAP-MP 0.47UFJ 50V P:5.0MM
C348	5156100T16	CAP-EC6 10UFM 16V -RT-
C349	5075474563	CAP-MEF 0.47UFJ 63V P:5.0mm -R
C350	5156100T50	CAP-EC6 10UFM 50V -RT-
C351	5121330552	CAP-CCCH 33PFJ 50V -RT-
C352	5116104111	CAP-MC 0.1UFK 100V -RT-
C353	5116104111	CAP-MC 0.1UFK 100V -RT-
C360	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C361	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C362	5190224543	CAP-MPP 0.22UFJ 400V P:22.5MM
C363	5116104111	CAP-MC 0.1UFK 100V -RT-
C364	5101681132	CAP-CCB 680PFK 1KV -RT-
C365	5156100T16	CAP-EC6 10UFM 16V -RT-
C366	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C367	5190564583	CAP-MPP 0.56UFJ 250V -SF-
C368	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C369	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C370	5116104111	CAP-MC 0.1UFK 100V -RT-
C371	5116104111	CAP-MC 0.1UFK 100V -RT-
C372	5116104111	CAP-MC 0.1UFK 100V -RT-
C373	5101101132	CAP-CCB 100PFK 1KV -RT-
C380	5101222142	CAP-CCB 2200PFK 500V -RT-
C381	5101221193	CAP-CCB 220PFK 3KV -SF-
C388	5156100T16	CAP-EC6 10UFM 16V -RT-
C389	5156470T25	CAP-EC6 47UFM 25V -RT-
C390	5156470T25	CAP-EC6 47UFM 25V -RT-
C391	5116104111	CAP-MC 0.1UFK 100V -RT-
C601	5156220S03	CAP-EC6 22UFM 250V -SF-
C604	5128101552	CAP-CCSL 100PFJ 50V -RT-
C605	5116222111	CAP-MC 0.0022UFK 100V -RT-
C606	5128471552	CAP-CCSL 470PFJ 50V -RT-
C607	5156100T50	CAP-EC6 10UFM 50V -RT-
C608	5116102111	CAP-MC 0.001UFK 100V -RT-
C609	5116223111	CAP-MC 0.022UFK 100V -RT-
C610	5156100T16	CAP-EC6 10UFM 16V -RT-
C611	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C612	5116104111	CAP-MC 0.1UFK 100V -RT-
C613	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C614	5116333111	CAP-MC 0.033UFK 100V -RT-
C615	5156470T16	CAP-EC6 47UFM 16V -RT-
C801	5156109T50	CAP-EC6 1UFM 50V -RT-
C802	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C803	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C804	5156101T16	CAP-EC6 100UFM 16V -RT-
C805	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C806	5128390552	CAP-CCSL 39PFJ 50V -RT-
C807	5128390552	CAP-CCSL 39PFJ 50V -RT-
C808	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C809	5101102152	CAP-CCB 1000PFK 50V -RT-
C810	5128221552	CAP-CCSL 220PFJ 50V -RT-
C811	5128221552	CAP-CCSL 220PFJ 50V -RT-

REF	PART NO.	DESCRIPTION
C812	5128390552	CAP-CCSL 39PFJ 50V -RT-
C813	5128390552	CAP-CCSL 39PFJ 50V -RT-
C814	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C815	5128101552	CAP-CCSL 100PFJ 50V -RT-
C816	5128101552	CAP-CCSL 100PFJ 50V -RT-
C817	5128681552	CAP-CCSL 680PFJ 50V -RT-
C902	5065224428	CAP-MPR 0.22UFM 275V -SF-
C903	5061472440	CAP-CCS 4700PFM 400V -SF-
C904	5061472440	CAP-CCS 4700PFM 400V -SF-
C905	5061472440	CAP-CCS 4700PFM 400V -SF-
C906	5061472440	CAP-CCS 4700PFM 400V -SF-
C907	515P331S04	CAP-ECP 330UFM 400V -SF-
C908	5074104104	CAP-MEF 0.1UFK 400V P:15MM -SF
C909	510H4711C3	CAP-CCR 470PFK 2KV P:7.5mm -SF
C910	5156470T35	CAP-EC6 47UFM 35V -RT-
C911	5156220T01	CAP-EC6 22UFM 100V -RT-
C912	5074103501	CAP-MEF 0.01UFJ 100V -SF-
C913	5128271552	CAP-CCSL 270PFJ 50V -RT-
C914	5128681552	CAP-CCSL 680PFJ 50V -RT-
C915	5156109T50	CAP-EC6 1UFM 50V -RT-
C916	5116472111	CAP-MC 0.0047UFK 100V -RT-
C917	5156101T16	CAP-EC6 100UFM 16V -RT-
C918	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C919	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C920	5128331552	CAP-CCSL 330PFJ 50V -RT-
C921	5074104101	CAP-MEF 0.1UFK 100V -SF-
C922	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C923	5156471S25	CAP-EC6 470UFM 25V -SF-
C924	5156471T16	CAP-EC6 470UFM 16V -RT-
C925	5156221S01	CAP-EC6 220UFM 100V -SF-
C926	5156221S02	CAP-EC6 220UFM 160V -SF-
C928	5156102S25	CAP-EC6 1000UFM 25V -SF-
C930	5156471T25	CAP-EC6 470UFM 25V -RT-
C931	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C932	5065474428	CAP-MPR 0.47UFM 275V -SF-
C935	5116472111	CAP-MC 0.0047UFK 100V -RT-
C936	5101332152	CAP-CCB 3300PFK 50V -RT-
C939	5101102132	CAP-CCB 1000PFK 1KV -RT-
C940	5101101193	CAP-CCB 100PFK 3KV -SF- P:7.5M
C944	5101102132	CAP-CCB 1000PFK 1KV -RT-
C945	5101102132	CAP-CCB 1000PFK 1KV -RT-
C948	5156471S35	CAP-EC6 470UFM 35V -SF-
C949	5061472440	CAP-CCS 4700PFM 400V -SF-
C950	5061472440	CAP-CCS 4700PFM 400V -SF-
C955	515X471S16	CAP-ECX 470UFM 16V -SF-
C956	5075474563	CAP-MEF 0.47UFJ 63V P:5.0mm -R
C957	5101102132	CAP-CCB 1000PFK 1KV -RT-
C958	5101102132	CAP-CCB 1000PFK 1KV -RT-
D101	4120141480	DIODE 1N4148 (SI) -AT-
D102	4120141480	DIODE 1N4148 (SI) -AT-
D103	4120141480	DIODE 1N4148 (SI) -AT-
D104	4120141480	DIODE 1N4148 (SI) -AT-
D105	4120146060	DIODE 1N4606 (SI) -AT-
D106	4120141480	DIODE 1N4148 (SI) -AT-
D107	4120141480	DIODE 1N4148 (SI) -AT-
D110	4130500200	DIODE CTP-G2 FR TO-220
D111	413020426C	DIODE 2.3A/600V BYM26C -AT-
D112	4130104004	DIODE UF4004 400V/1A -AT-
D113	413020426C	DIODE 2.3A/600V BYM26C -AT-
D114	4130010212	DIODE RGP02-12E 1200V/0.5A -AT

REF	PART NO.	DESCRIPTION
D120	4120141480	DIODE 1N4148 (SI) -AT-
D121	4120141480	DIODE 1N4148 (SI) -AT-
D122	4120141480	DIODE 1N4148 (SI) -AT-
D123	413010010J	DIODE RGP10J-5390 1A 600V -AT-
D124	413010010J	DIODE RGP10J-5390 1A 600V -AT-
D125	4120141480	DIODE 1N4148 (SI) -AT-
D130	413010010J	DIODE RGP10J-5390 1A 600V -AT-
D201	4120141480	DIODE 1N4148 (SI) -AT-
D202	4120104001	DIODE 1N4001 -AT-
D203	4120104001	DIODE 1N4001 -AT-
D204	4120141480	DIODE 1N4148 (SI) -AT-
D301	4120141480	DIODE 1N4148 (SI) -AT-
D302	413010010J	DIODE RGP10J-5390 1A 600V -AT-
D303	413020120A	DIODE EGP-20A -AT-
D304	4131014590	DIODE BY459F-1500 SOD-100
D305	4130100218	DIODE RGP02-18E-5300 -AT-
D306	413010010D	DIODE RGP10D-5302 -AT- 1A
D307	4120141480	DIODE 1N4148 (SI) -AT-
D308	413010010D	DIODE RGP10D-5302 -AT- 1A
D309	413010010D	DIODE RGP10D-5302 -AT- 1A
D310	4130100218	DIODE RGP02-18E-5300 -AT-
D311	4120141480	DIODE 1N4148 (SI) -AT-
D312	4120104001	DIODE 1N4001 -AT-
D317	413010010J	DIODE RGP10J-5390 1A 600V -AT-
D601	4120141480	DIODE 1N4148 (SI) -AT-
D602	41303030F4	DIODE 30DF4
D603	4120141480	DIODE 1N4148 (SI) -AT-
D604	4120141480	DIODE 1N4148 (SI) -AT-
D605	4120141480	DIODE 1N4148 (SI) -AT-
D805	4120141480	DIODE 1N4148 (SI) -AT-
D806	4120141480	DIODE 1N4148 (SI) -AT-
D807	4120141480	DIODE 1N4148 (SI) -AT-
D808	4120141480	DIODE 1N4148 (SI) -AT-
D810	4120141480	DIODE 1N4148 (SI) -AT-
D812	4120141480	DIODE 1N4148 (SI) -AT-
D813	4120141480	DIODE 1N4148 (SI) -AT-
D814	4120141480	DIODE 1N4148 (SI) -AT-
D815	4120141480	DIODE 1N4148 (SI) -AT-
D905	413010426C	DIODE BYV26C KINK FORMING -AT-
D906	413010426C	DIODE BYV26C KINK FORMING -AT-
D907	413010010D	DIODE RGP10D-5302 -AT- 1A
D908	413010010D	DIODE RGP10D-5302 -AT- 1A
D909	4120141480	DIODE 1N4148 (SI) -AT-
D910	4120141480	DIODE 1N4148 (SI) -AT-
D911	4120141480	DIODE 1N4148 (SI) -AT-
D912	4120146060	DIODE 1N4606 (SI) -AT-
D913	4120141480	DIODE 1N4148 (SI) -AT-
D914	4120141480	DIODE 1N4148 (SI) -AT-
D915	41303031F4	DIODE 3A/400V 35NS 31DF4 -AT-
D916	41303031F4	DIODE 3A/400V 35NS 31DF4 -AT-
D918	41303030F2	DIODE 30DF2
D919	41303030F1	DIODE 30DF1
D920	41303030F2	DIODE 30DF2
D921	4120104001	DIODE 1N4001 -AT-
D922	4120141480	DIODE 1N4148 (SI) -AT-
D923	4120141480	DIODE 1N4148 (SI) -AT-
D924	413010010D	DIODE RGP10D-5302 -AT- 1A
D925	41303031F6	DIODE 31DF6
D926	41303031F6	DIODE 31DF6
D928	413010010D	DIODE RGP10D-5302 -AT- 1A

REF.	PART NO.	DESCRIPTION
D929	4130100 10D	DIODE RGP10D-5302 -AT- 1A
D930	41301011Q6	DIODE 11DQ06 -AT-
DY	4490400207	CONN. 4P WAFER ROUND PIN
F901	5268400052	FUSE 4A/250VAC
FB101	4322209046	FERRITE BEAD 2UH -AT-
FB102	4322209046	FERRITE BEAD 2UH -AT-
FB103	4322209046	FERRITE BEAD 2UH -AT-
FB601	4322209046	FERRITE BEAD 2UH -AT-
FB602	4322209046	FERRITE BEAD 2UH -AT-
FB603	4322209046	FERRITE BEAD 2UH -AT-
FB801	4322209046	FERRITE BEAD 2UH -AT-
FB802	4322209046	FERRITE BEAD 2UH -AT-
FB803	4322209046	FERRITE BEAD 2UH -AT-
FB901	4322209046	FERRITE BEAD 2UH -AT-
FB902	4322209046	FERRITE BEAD 2UH -AT-
FB903	4322209046	FERRITE BEAD 2UH -AT-
IC101	4159594000	IC TL594CN 16PIN
IC201	4159817200	IC TDA8172 7PIN
IC301	4159129100	IC LM1291 28PIN
IC302	4159129500	IC LM1295 24PIN
IC303	4159358000	IC LMT358N 8PIN
IC304	4159781201	IC MCT7812CT-TO-220AB
IC306	4159317001	IC LM317T W/MOUNTING KIT TO-22
IC320	4159358000	IC LMT358N 8PIN
IC601	4159384300	IC UC3843A 8PIN
IC801	4159687051	#IC XC68HC705BD5P 40PIN
IC802	415924L160	IC 24LC16 8PIN DIP
IC803	4152742730	IC 74LS273 20PIN
IC804	4159242100	IC 24LC21 8PIN
IC805	4155074860	IC 74HC86 14PIN
IC901	4159384200	IC UC3842A 8PIN
IC902	4159780501	IC 7805 REGULATOR 3PIN
IC903	415943100A	IC TL431 REGULATOR TO-92 -RT-
L101	4321399006	COIL PEAKING 3.9UH -AT-
L103	4321151006	COIL PEAKING 150UH -AT-
L301	4321479006	COIL PEAKING 4.7UH -AT-
L302	4321479006	COIL PEAKING 4.7UH -AT-
L303	4323802003	CHOKE COIL 0.8mH
L304	708S207H10	COIL LINEARITY -SF-
L305	4323900103	COIL CHOKE 90UH -SF-
L306	4323809003	COIL CHOKE 8mH 15X14
L307	4321151006	COIL PEAKING 150UH -AT-
L601	432A151006	COIL PEAKING 150uH SMALL -AT-
L901	4321330006	COIL PEAKING 33UH -AT-
P301	C488100025	CONN. 10P & WIRE ASS'Y 350mm W
P302	4490200130	CONN. 2P WAFER 2.5MM
P303	C488120040	CONN. 12P & WIRE ASS'Y 400mm
P801	4491000260	CONN. 10P WAFER TYPE:1-173981-
P901	7067F20122	LINE FILTER IX-0342-P
P902	4490300190	CONN. 3.96 3P W/O PIN 2 -SF-
P903	4490200207	CONN. 2P WAFER ROUND PIN 10MM
PH901	4159435002	POTO COUPLER X'STER 4N35 W=10
PTCR	7021141400	PTCR DGC 2R14M
Q101	411022120Y	TRS. 2SC2120Y TO-92 -RT-
Q102	4110007330	TRS. 2SA733 TO-92M -RT-
Q103	4105907400	TRS. IRF740
Q104	4105906200	TRS. MOSFET IRF620 TO-220
Q105	4100252970	TRS. 2SC5297 TO-3P
Q106	4100226880	TRS. 2SC2688 TO-126
Q107	4116612030	TRS. RN1203 -RT-

REF.	PART NO.	DESCRIPTION
Q108	4110007330	TRS. 2SA733 TO-92M -RT-
Q110	4110007330	TRS. 2SA733 TO-92M -RT-
Q111	4112409200	TRS. KSP92 TO-92
Q202	411030667C	TRS. 2SD667C TO-92M -RT-
Q203	411020945P	TRS. 2SC945P TO-92 -RT-
Q204	411020945P	TRS. 2SC945P TO-92 -RT-
Q205	411020945P	TRS. 2SC945P TO-92 -RT-
Q207	4116612030	TRS. RN1203 -RT-
Q301	4116612030	TRS. RN1203 -RT-
Q302	4105906200	TRS. MOSFET IRF620 TO-220
Q303	410024290A	TRS. 2SC4290A TO-3PL
Q304	4110007330	TRS. 2SA733 TO-92M -RT-
Q305	411020945P	TRS. 2SC945P TO-92 -RT-
Q306	411020945P	TRS. 2SC945P TO-92 -RT-
Q307	4105906400	TRS. IRF640 TO-220
Q308	4100108610	TRS. 2SB861
Q311	411020945P	TRS. 2SC945P TO-92 -RT-
Q312	4110007330	TRS. 2SA733 TO-92M -RT-
Q320	4116612030	TRS. RN1203 -RT-
Q330	4105906400	TRS. IRF640 TO-220
Q331	4116612030	TRS. RN1203 -RT-
Q332	4116612030	TRS. RN1203 -RT-
Q333	4105906300	TRS. IRF630 TO-220
Q340	411030667C	TRS. 2SD667C TO-92M -RT-
Q341	411010647C	TRS. 2SB647C TO-92M -RT-
Q601	4105908400	TRS. IRF840 TO-220
Q602	4110007330	TRS. 2SA733 TO-92M -RT-
Q603	4111139040	TRS. 2N3904 TO-92 -RT-
Q604	411020945P	TRS. 2SC945P TO-92 -RT-
Q605	4111139060	TRS. 2N3906 TO-92 -RT-
Q606	4116612030	TRS. RN1203 -RT-
Q801	411020945P	TRS. 2SC945P TO-92 -RT-
Q802	411020945P	TRS. 2SC945P TO-92 -RT-
Q901	410030669A	TRS. 2SD669A TO-126
Q902	41035010K0	TRS. FS10KM-12 TO-220F
Q903	4114501006	TRS. MCR100-6 TO-92 -RT-
Q904	4110105610	TRS. 2SB561 TO-92 -RT-
Q905	4116612030	TRS. RN1203 -RT-
Q906	410030669A	TRS. 2SD669A TO-126
Q907	411020945P	TRS. 2SC945P TO-92 -RT-
Q915	411020945P	TRS. 2SC945P TO-92 -RT-
R101	4050530255	RES-CF 1/4W J 3K -AT- SMALL
R102	4050568255	RES-CF 1/4W J 6.8K SMALL -AT-
R103	4050515455	RES-CF 1/4W J 150K SMALL -AT-
R104	4050551255	RES-CF 1/4W J 5.1K -AT- SMALL
R105	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R106	4050551255	RES-CF 1/4W J 5.1K -AT- SMALL
R107	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R108	4050533255	RES-CF 1/4W J 3.3K -AT- SMALL
R109	4050527355	RES-CF 1/4W J 27K -AT- SMALL
R110	4050524055	RES-CF 1/4W J 24R SMALL -AT-
R111	4050520255	RES-CF 1/4W J 2K -AT- SMALL
R112	4050513155	RES-CF 1/4W J 130R SMALL -AT-
R113	4050512455	RES-CF 1/4W J 120K -AT- SMALL
R115	4172068053	RES-MOF 2W J 68R -SF-
R116	4050133955	RES-CF 1/2W J 3.3R -AT- SMALL
R117	4050110155	RES-CF 1/2W J 100R SMALL -AT-
R118	4050120455	RES-CF 1/2W J 200K SMALL -AT-
R119	4050543455	RES-CF 1/4W J 430K SMALL -AT-
R120	4050543455	RES-CF 1/4W J 430K SMALL -AT-

REF	PART NO	DESCRIPTION
R121	4050527255	RES-CF 1/4W J 2.7K -AT- SMALL
R122	4050568455	RES-CF 1/4W J 680K SMALL -AT-
R123	4050510055	RES-CF 1/4W J 10R -AT- SMALL
R125	4050556155	RES-CF 1/4W J 560R -AT- SMALL
R129	4171075956	RES-MOF 1W J 7.5R -AT-
R130	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R131	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R132	4050522555	RES-CF 1/4W J 2.2M SMALL -AT-
R133	4050512355	RES-CF 1/4W J 12K -AT- SMALL
R136	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R138	4050512455	RES-CF 1/4W J 120K -AT- SMALL
R139	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R140	4050524355	RES-CF 1/4W J 24K -AT- SMALL
R145	4050524355	RES-CF 1/4W J 24K -AT- SMALL
R146	4050515355	RES-CF 1/4W J 15K -AT- SMALL
R150	4050115955	RES-CF 1/2W J 1.5R -AT- SMALL
R151	4050133155	RES-CF 1/2W J 330R -AT- SMALL
R156	4050511455	RES-CF 1/4W J 110K SMALL -AT-
R157	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R201	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R202	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R203	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R204	4050575455	RES-CF 1/4W J 750K SMALL -AT-
R205	4050511355	RES-CF 1/4W J 11K SMALL -AT-
R206	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R207	4050520455	RES-CF 1/4W J 200K -AT- SMALL
R208	4050520255	RES-CF 1/4W J 2K -AT- SMALL
R209	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R210	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R212	4050536355	RES-CF 1/4W J 36K -AT- SMALL
R213	4050536355	RES-CF 1/4W J 36K -AT- SMALL
R214	4257044323	RES-PR MF 1/4W F 432K SMALL -A
R216	4257048251	RES-PR MF 1/4W F 8.25K AT SMAL
R218	4050582955	RES-CF 1/4W J 8.2R SMALL -AT-
R219	4257043922	RES-PR MF 1/4W F 39.2K AT SMAL
R220	4050512955	RES-CF 1/4W J 1.2R SMALL -AT-
R221	4050147155	RES-CF 1/2W J 470R -AT- SMALL
R223	4171015956	RES-MOF 1W J 1.5R -AT-
R224	4257041502	RES-PR MF 1/4W F 15K AT SMALL
R225	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R226	4050110255	RES-CF 1/2W J 1K SMALL -AT-
R227	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R228	4050122255	RES-CF 1/2W J 2.2K SMALL -AT-
R229	4050510055	RES-CF 1/4W J 10R -AT- SMALL
R230	4172010953	RES-MOF 2W J 1R -SF-
R231	4050551155	RES-CF 1/4W J 510R SMALL -AT-
R232	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R233	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R234	4050568355	RES-CF 1/4W J 68K -AT- SMALL
R235	4050591355	RES-CF 1/4W J 91K SMALL -AT-
R236	4257041502	RES-PR MF 1/4W F 15K AT SMALL
R237	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R238	4050568155	RES-CF 1/4W J 680R SMALL -AT-
R239	4050520255	RES-CF 1/4W J 2K -AT- SMALL
R241	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R242	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R243	4050512355	RES-CF 1/4W J 12K -AT- SMALL
R244	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R245	4050575355	RES-CF 1/4W J 75K SMALL -AT-
R301	4257041962	RES-PR MF 1/4W F 19.6K SMALL -

REF	PART NO	DESCRIPTION
R302	4257042672	RES-PR MF 1/4W F 26.7K AT SMAL
R303	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R304	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R305	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R306	4050520255	RES-CF 1/4W J 2K -AT- SMALL
R310	4050522255	RES-CF 1/4W J 2.2K -AT- SMALL
R311	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R312	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R315	4050510455	RES-CF 1/4W J 100K -AT- SMALL
R316	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R317	4171024156	RES-MOF 1W J 240R -AT-
R318	4172068053	RES-MOF 2W J 0.68R -SF-
R320	4177275853	RES-MOF 2W J 0.75R SMALL -SF-
R323	4050515355	RES-CF 1/4W J 15K -AT- SMALL
R324	4050556255	RES-CF 1/4W J 5.6K -AT- SMALL
R325	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R326	4257043651	RES-PR MF 1/4W F 3.65K AT SMAL
R327	4050522255	RES-CF 1/4W J 2.2K -AT- SMALL
R328	4257044320	RES-PR MF 1/4W F 432R SMALL -A
R329	4050515455	RES-CF 1/4W J 150K SMALL -AT-
R330	4172016153	RES-MOF 2W J 160R -SF-
R331	4257041004	RES-PR MF 1/4W F 1M SMALL -AT-
R332	4050547355	RES-CF 1/4W J 47K -AT- SMALL
R333	4171010256	RES-MOF 1W J 1K -AT-
R334	4172010953	RES-MOF 2W J 1R -SF-
R335	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R336	4171010456	RES-MOF 1W J 100K -AT-
R346	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R348	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R349	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R350	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R351	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R353	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R354	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R355	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R356	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R357	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R358	4050522155	RES-CF 1/4W J 220R SMALL -AT-
R359	4050510555	RES-CF 1/4W J 1M -AT- SMALL
R360	4050515355	RES-CF 1/4W J 15K -AT- SMALL
R361	4050539255	RES-CF 1/4W J 3.9K -AT- SMALL
R362	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R363	4050510455	RES-CF 1/4W J 100K -AT- SMALL
R364	4050512355	RES-CF 1/4W J 12K -AT- SMALL
R368	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R369	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R370	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R371	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R380	4050522255	RES-CF 1/4W J 2.2K -AT- SMALL
R383	4050110455	RES-CF 1/2W J 100K SMALL -AT-
R384	4050522255	RES-CF 1/4W J 2.2K -AT- SMALL
R385	4050110455	RES-CF 1/2W J 100K SMALL -AT-
R386	4050522255	RES-CF 1/4W J 2.2K -AT- SMALL
R388	4050110455	RES-CF 1/2W J 100K SMALL -AT-
R390	4050520355	RES-CF 1/4W J 20K -AT- SMALL
R391	4050518455	RES-CF 1/4W J 180K SMALL -AT-
R392	4050520455	RES-CF 1/4W J 200K -AT- SMALL
R393	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R394	4172051053	RES-MOF 2W J 51R -SF-
R395	4050112155	RES-CF 1/2W J 120R SMALL -AT-

REF.	PART NO.	DESCRIPTION
R396	4177320353	RES-MOF 3W J 20K SF SMALL
R397	4177320353	RES-MOF 3W J 20K SF SMALL
R399	4050515355	RES-CF 1/4W J 15K -AT- SMALL
R3A1	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R3A2	4050112055	RES-CF 1/2W J 12R SMALL -AT-
R3A3	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R3A4	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R3A5	4050556255	RES-CF 1/4W J 5.6K -AT- SMALL
R3A6	4050515355	RES-CF 1/4W J 15K -AT- SMALL
R3A7	4050518455	RES-CF 1/4W J 180K SMALL -AT-
R3A8	4050513455	RES-CF 1/4W J 130K SMALL -AT-
R3A9	4257043922	RES-PR MF 1/4W F 39.2K AT SMAL
R3B1	4050512355	RES-CF 1/4W J 12K -AT- SMALL
R3B2	4050539255	RES-CF 1/4W J 3.9K -AT- SMALL
R3B3	4050568255	RES-CF 1/4W J 6.8K SMALL -AT-
R3B4	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R3B5	4257041002	RES-PR MF 1/4W F 10K AT SMALL
R3B6	4257042741	RES-PR MF 1/4W F 2.74K SMALL -
R3B7	4050513355	RES-CF 1/4W J 13K SMALL -AT-
R3B8	4050582255	RES-CF 1/4W J 8.2K -AT- SMALL
R3B9	4050527255	RES-CF 1/4W J 2.7K -AT- SMALL
R601	4050522955	RES-CF 1/4W J 2.2R SMALL -AT-
R602	4050518255	RES-CF 1/4W J 1.8K -AT- SMALL
R603	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R604	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R605	4050522255	RES-CF 1/4W J 2.2K -AT- SMALL
R606	4050539255	RES-CF 1/4W J 3.9K -AT- SMALL
R607	4050533355	RES-CF 1/4W J 33K SMALL -AT-
R608	4050562355	RES-CF 1/4W J 62K SMALL -AT-
R609	4050522355	RES-CF 1/4W J 22K SMALL -AT-
R610	4050527355	RES-CF 1/4W J 27K -AT- SMALL
R611	4050556255	RES-CF 1/4W J 5.6K -AT- SMALL
R612	4050539255	RES-CF 1/4W J 3.9K -AT- SMALL
R613	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R614	4050547355	RES-CF 1/4W J 47K -AT- SMALL
R615	4050522255	RES-CF 1/4W J 2.2K -AT- SMALL
R616	4050182055	RES-CF 1/2W J 82R SMALL -AT-
R617	4050510055	RES-CF 1/4W J 10R -AT- SMALL
R618	4050512355	RES-CF 1/4W J 12K -AT- SMALL
R619	4050168155	RES-CF 1/2W J 680R -AT- SMALL
R620	4050551155	RES-CF 1/4W J 510R SMALL -AT-
R801	4050551055	RES-CF 1/4W J 51R -AT- SMALL
R802	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R803	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R804	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R805	4050575255	RES-CF 1/4W J 7.5K -AT- SMALL
R806	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R807	4050575155	RES-CF 1/4W J 750R SMALL -AT-
R808	4050520255	RES-CF 1/4W J 2K -AT- SMALL
R809	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R810	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R811	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R812	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R813	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R816	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R817	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R818	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R819	4050510455	RES-CF 1/4W J 100K -AT- SMALL
R820	4050510455	RES-CF 1/4W J 100K -AT- SMALL
R821	4050510255	RES-CF 1/4W J 1K -AT- SMALL

REF.	PART NO.	DESCRIPTION
R822	4050575155	RES-CF 1/4W J 750R SMALL -AT-
R901	710501003B	THMER. +-15% 10R 5A 15¢ W/KINK
R902	4171033856	RES-MOF 1W J 0.33R -AT-
R903	4172036353	RES-MOF 2W J 36K SF
R904	4172036353	RES-MOF 2W J 36K SF
R905	4095010356	RES-WW 5W J 10K
R906	4095020256	RES-WW 5W J 2K SQY-A
R907	4050124355	RES-CF 1/2W J 24K -AT- SMALL
R908	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R909	4050527255	RES-CF 1/4W J 2.7K -AT- SMALL
R910	4050518055	RES-CF 1/4W J 18R -AT- SMALL
R911	4050539055	RES-CF 1/4W J 39R -AT- SMALL
R912	4257047321	RES-PR MF 1/4W F 7.32K SMALL -
R914	4172033853	RES-MOF 2W J 0.33R SF
R915	4050524255	RES-CF 1/4W J 2.4K SMALL -AT-
R916	4050520255	RES-CF 1/4W J 2K -AT- SMALL
R918	4050551255	RES-CF 1/4W J 5.1K -AT- SMALL
R919	4050556555	RES-CF 1/4W J 5.6M SMALL -AT-
R920	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R921	4050551255	RES-CF 1/4W J 5.1K -AT- SMALL
R922	4050551255	RES-CF 1/4W J 5.1K -AT- SMALL
R923	4050524055	RES-CF 1/4W J 24R SMALL -AT-
R924	4050520355	RES-CF 1/4W J 20K -AT- SMALL
R925	4050520155	RES-CF 1/4W J 200R -AT- SMALL
R926	4050556255	RES-CF 1/4W J 5.6K -AT- SMALL
R927	4050515355	RES-CF 1/4W J 15K -AT- SMALL
R928	4050582255	RES-CF 1/4W J 8.2K -AT- SMALL
R929	4050515355	RES-CF 1/4W J 15K -AT- SMALL
R930	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R931	4050522155	RES-CF 1/4W J 220R SMALL -AT-
R932	4050522155	RES-CF 1/4W J 220R SMALL -AT-
R933	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R934	4050539255	RES-CF 1/4W J 3.9K -AT- SMALL
R935	4050522155	RES-CF 1/4W J 220R SMALL -AT-
R936	4050547155	RES-CF 1/4W J 470R SMALL -AT-
R937	4257048872	RES-PR MF 1/4W F 88.7K SMALL -
R938	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R939	4257041742	RES-PR MF 1/4W F 17.4K AT SMAL
R940	4257043831	RES-PR MF 1/4W F 3.83K SMALL -
R941	4257044022	RES-PR MF 1/4W F 40.2K -AT- SM
R942	4050551255	RES-CF 1/4W J 5.1K -AT- SMALL
R943	4172033353	RES-MOF 2W J 33K SF
R945	4050110155	RES-CF 1/2W J 100R SMALL -AT-
R950	4172013953	RES-MOF 2W J 1.3R SF
R951	4050575155	RES-CF 1/4W J 750R SMALL -AT-
R955	4050562055	RES-CF 1/4W J 62R SMALL -AT-
R956	4050182455	RES-CF 1/2W J 820K SMALL -AT-
R957	4050515555	RES-CF 1/4W J 1.5M SMALL -AT-
R958	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R959	4050156555	RES-CF 1/2W J 5.6M SMALL -AT-
R960	4050551055	RES-CF 1/4W J 51R -AT- SMALL
R961	4050551055	RES-CF 1/4W J 51R -AT- SMALL
R962	4050551055	RES-CF 1/4W J 51R -AT- SMALL
R964	4050515555	RES-CF 1/4W J 1.5M SMALL -AT-
R965	4050151055	RES-CF 1/2W J 51R -AT- SMALL
R966	4050551055	RES-CF 1/4W J 51R -AT- SMALL
RL301	4420812005	RELAY JW 2HN-DC12V
RL901	4420812005	RELAY JW 2HN-DC12V
RN801	4082074725	RES-NET 7P J 4.7K COMMON
RN802	4082094725	RES-NET 9P J 4.7K COMMON

REF.	PART NO.	DESCRIPTION
RN803	4082074725	RES-NET 7P J 4.7K COMMON
SG101	5106122304	SPARK GAP 1.2KV AG-15 P:5.0MM
SW301	4410803000	SWITCH LEVER KEC1301
SW901	4410202005	POWER SWITCH SS-160-7S SPST
T101	7050257H10	DRIVER TRANSFORMER
T102	7050907H10	AV-TRANSFORMER (O/P)
T103	7050307H10	F.B.T.
T104	7050519000	FOCUS TRANSFORMER
T301	7050207H10	H-DRIVER TRANSFORMER
T601	7177H10000	TRANSDUCER CURRENT SENSOR
T602	7050957H10	H-TRANSFORMER (O/P)
T603	705025423L	DRIVER TRANSFORMER
T902	7067H10303	CHOKE COMMON MODE
T903	7050107H10	POWER TRANSFORMER
VR101	5225110410	POT(CERMET) 0.3W 100K 6¢ LAY-D
VR102	5221150300	POT(CERMET) 0.3W 50K 6¢ STAND-
VR106	5225150310	POT(CERMET) 0.3W 50K 6¢ LAY-DO
VR107	5221125400	POT(CERMET) 0.3W 250K 6¢ STAND
X801	7154000005	CRYSTAL 4.00MHz
ZD101	4120510160	Z-D Z10-160B 1W 160V+-5% DO-41
ZD302	41205009C1	DIODE ZENER HZ9C1 -AT-
ZD336	4120500152	DIODE ZENER 14.5-15.1V -AT-
ZD370	4120500152	DIODE ZENER 14.5-15.1V -AT-
ZD387	4120500152	DIODE ZENER 14.5-15.1V -AT-
ZD601	4120500152	DIODE ZENER 14.5-15.1V -AT-
ZD602	41205007C2	DIODE ZENER HZ7C-2 -AT-
ZD801	41205003C2	DIODE ZENER HZ3C2 -AT-
ZD802	41205005C1	DIODE ZENER HZ5C1 5.1V -AT-
ZD901	4120501802	DIODE ZENER HZ18-2 V -AT-
ZD902	4120501802	DIODE ZENER HZ18-2 V -AT-
ZD903	4120502402	DIODE ZENER 1/2W 24V HZ24-2 -A-
ZD904	4120501202	DIODE ZENER 1/2W 12V HZ12A1 -A-

9.3. Neck Board

REF.	PART NO.	DESCRIPTION
	RH7H100244 -V	NECK PCB ASS'Y
	2009191530	HEAT SINK FOR IC1
	3011100030	NUT ISO HEX M3 Z1NC FOR IC1
	4141116100	#P.C.B. NECK
	4491200300	BASE 12P 2.54MM SXB-XH-A FOR P1
	8026113010	SCREW BIND(+) TAPPING M3X10 TR PCB & IC1 H-SINK
	8504113016	SCREW BID(+) MACH W/D ZINC M3X FOR IC1
	C459433L60	GND WIRE ASS'Y FOR NECK PCB TO SHIELD
C1	5156100T50	CAP-EC6 10UFM 50V -RT-
C10	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C13	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C19	5156101T16	CAP-EC6 100UFM 16V -RT-
C2	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C3	515X101T16	CAP-ECX 100UFM 16V -RT-
C30	5156100T50	CAP-EC6 10UFM 50V -RT-
C31	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C32	5156109T50	CAP-EC6 1UFM 50V -RT-
C33	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C34	5121390552	CAP-CCCH 39PFJ 50V -RT-
C35	5075104501	CAP-MEF 0.1UFJ 100V CF
C39	5156109T01	CAP-EC6 1UFM 100V -RT-
C4	5121390552	CAP-CCCH 39PFJ 50V -RT-
C5	5075104501	CAP-MEF 0.1UFJ 100V CF
C50	5156100T50	CAP-EC6 10UFM 50V -RT-
C51	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C53	5128561552	CAP-CCSL 560PFJ 50V -RT-
C54	5121390552	CAP-CCCH 39PFJ 50V -RT-
C55	5075104501	CAP-MEF 0.1UFJ 100V CF
C59	5156109T01	CAP-EC6 1UFM 100V -RT-
C60	7140104214	CAP-X7R 0.1UFM 100V -RT-
C61	515X470S01	CAP-ECX 47UFM 100V -SF-
C62	5101103233	CAP-CCB 0.01UFM 1KV -SF-
C63	5103102293	CAP-CCE 1000PFM 3KV -SF-
C64	5156101T16	CAP-EC6 100UFM 16V -RT-
C7	5121101552	CAP-CCCH 100PFJ 50V -RT-
C70	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C71	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C72	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C74	5121101552	CAP-CCCH 100PFJ 50V -RT-
C75	5156109T50	CAP-EC6 1UFM 50V -RT-
C76	7140104214	CAP-X7R 0.1UFM 100V -RT-
C77	7140104214	CAP-X7R 0.1UFM 100V -RT-
C78	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C79	5156102S16	CAP-EC6 1000UFM 16V -SF-
C8	5101102152	CAP-CCB 1000PFK 50V -RT-
C81	7140104214	CAP-X7R 0.1UFM 100V -RT-
C83	5101222152	CAP-CCB 2200PFK 50V -RT-
C85	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C86	5116472111	CAP-MC 0.0047UFK 100V -RT-
C87	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C88	5156101T16	CAP-EC6 100UFM 16V -RT-
C89	5156109T50	CAP-EC6 1UFM 50V -RT-
C9	5156109T01	CAP-EC6 1UFM 100V -RT-
C90	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C91	5101102152	CAP-CCB 1000PFK 50V -RT-
C92	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C93	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C94	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C95	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C96	515X109T50	CAP-ECX 1UFM 50V -RT-
C97	5156100T50	CAP-EC6 10UFM 50V -RT-
C98	5134104452	CAP-SCF 0.1UFZ 50V -RT-
C99	5134104452	CAP-SCF 0.1UFZ 50V -RT-
CRT1	4570207F10	SOCKET CRT
D1	4120141480	DIODE 1N4148 (SI) -AT-
D2	4120141480	DIODE 1N4148 (SI) -AT-
D30	4120141480	DIODE 1N4148 (SI) -AT-
D31	4120141480	DIODE 1N4148 (SI) -AT-
D34	413258020U	DIODE BAV20 DO-35 -AT-
D35	413258020U	DIODE BAV20 DO-35 -AT-
D36	413258020U	DIODE BAV20 DO-35 -AT-
D37	4120141480	DIODE 1N4148 (SI) -AT-
D4	413258020U	DIODE BAV20 DO-35 -AT-
D5	413258020U	DIODE BAV20 DO-35 -AT-
D50	4120141480	DIODE 1N4148 (SI) -AT-
D51	4120141480	DIODE 1N4148 (SI) -AT-
D54	413258020U	DIODE BAV20 DO-35 -AT-
D55	413258020U	DIODE BAV20 DO-35 -AT-
D56	413258020U	DIODE BAV20 DO-35 -AT-

REF.	PART NO.	DESCRIPTION
D57	4120141480	DIODE 1N4148 (SI) -AT-
D6	413258020U	DIODE BAV20 DO-35 -AT-
D7	4120141480	DIODE 1N4148 (SI) -AT-
D70	4120141480	DIODE 1N4148 (SI) -AT-
D71	4120141480	DIODE 1N4148 (SI) -AT-
D74	4120141480	DIODE 1N4148 (SI) -AT-
D79	4120141480	DIODE 1N4148 (SI) -AT-
D80	4120141480	DIODE 1N4148 (SI) -AT-
D81	413010426C	DIODE BYV26C KINK FORMING -AT-
D83	4120141480	DIODE 1N4148 (SI) -AT-
D84	4120141480	DIODE 1N4148 (SI) -AT-
D85	4120141480	DIODE 1N4148 (SI) -AT-
FB11	4322309006	FERRITE BEAD 3UH -AT-
FB12	4322309006	FERRITE BEAD 3UH -AT-
FB70	4322309006	FERRITE BEAD 3UH -AT-
FB71	4322309006	FERRITE BEAD 3UH -AT-
FB72	4322309006	FERRITE BEAD 3UH -AT-
FB73	4322309006	FERRITE BEAD 3UH -AT-
FB74	4322309006	FERRITE BEAD 3UH -AT-
FB75	4322309006	FERRITE BEAD 3UH -AT-
FB78	4322309006	FERRITE BEAD 3UH -AT-
IC1	4159001000	IC VPS10S,15PIN
IC2	4159350430	IC M35043-001SP 20PIN
IC3	4159120500	IC LM1205N 28PIN
IC4	4159393000	IC LM 393 8PIN
IC5	41598444N0	IC TDA8444N 16PIN
L1	4321568006	COIL PEAKING 0.56UH -AT-
L31	4321568006	COIL PEAKING 0.56UH -AT-
L51	4321568006	COIL PEAKING 0.56UH -AT-
P5	3340230165	BEAD PIN 16.5X2.3¢
Q2	4111139040	TRS. 2N3904 TO-92 -RT-
Q3	4110219210	TRS. 2SC1921 TO-92M -RT-
Q33	4110219210	TRS. 2SC1921 TO-92M -RT-
Q4	4111139040	TRS. 2N3904 TO-92 -RT-
Q5	4110007330	TRS. 2SA733 TO-92M -RT-
Q53	4110219210	TRS. 2SC1921 TO-92M -RT-
Q6	4110007330	TRS. 2SA733 TO-92M -RT-
Q7	4110007330	TRS. 2SA733 TO-92M -RT-
Q70	4116612030	TRS. RN1203 -RT-
Q72	4111139040	TRS. 2N3904 TO-92 -RT-
Q73	4111139040	TRS. 2N3904 TO-92 -RT-
Q74	4116612030	TRS. RN1203 -RT-
R1	4257047509	RES-PR MF 1/4W F 75R AT SMALL
R10	4050510555	RES-CF 1/4W J 1M -AT- SMALL
R11	4050512355	RES-CF 1/4W J 12K -AT- SMALL
R14	4060247015	RES-CC 1/2W K 47R -AT-
R15	4050515255	RES-CF 1/4W J 1.5K SMALL -AT-
R16	4050162155	RES-CF 1/2W J 620R SMALL -AT-
R17	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R18	4050551155	RES-CF 1/4W J 510R SMALL -AT-
R19	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R2	4050533055	RES-CF 1/4W J 33R -AT- SMALL
R20	4050510055	RES-CF 1/4W J 10R -AT- SMALL
R21	4050133955	RES-CF 1/2W J 3.3R -AT- SMALL
R22	4257046811	RES-PR MF 1/4W F 6.81K SMALL -
R23	4257041001	RES-PR MF 1/4W F 1K AT SMALL
R24	4050582355	RES-CF 1/4W J 82K -AT- SMALL
R25	4050515155	RES-CF 1/4W J 150R SMALL -AT-
R26	4050522255	RES-CF 1/4W J 2.2K -AT- SMALL
R27	4050522255	RES-CF 1/4W J 2.2K -AT- SMALL

REF.	PART NO.	DESCRIPTION
R28	4050518555	RES-CF 1/4W J 1.8M SMALL -AT-
R29	4060210115	RES-CC 1/2W K 100R -AT-
R3	4050510055	RES-CF 1/4W J 10R -AT- SMALL
R30	4050522055	RES-CF 1/4W J 22R SMALL -AT-
R31	4257047509	RES-PR MF 1/4W F 75R AT SMALL
R32	4050533055	RES-CF 1/4W J 33R -AT- SMALL
R33	4050510055	RES-CF 1/4W J 10R -AT- SMALL
R34	4050522155	RES-CF 1/4W J 220R SMALL -AT-
R35	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R36	4050510055	RES-CF 1/4W J 10R -AT- SMALL
R37	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R38	4050533055	RES-CF 1/4W J 33R -AT- SMALL
R4	4050522155	RES-CF 1/4W J 220R SMALL -AT-
R40	4050510555	RES-CF 1/4W J 1M -AT- SMALL
R41	4050512355	RES-CF 1/4W J 12K -AT- SMALL
R44	4060247015	RES-CC 1/2W K 47R -AT-
R45	4050515255	RES-CF 1/4W J 1.5K SMALL -AT-
R46	4050162155	RES-CF 1/2W J 620R SMALL -AT-
R47	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R48	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R49	4050547255	RES-CF 1/4W J 4.7K -AT- SMALL
R5	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R50	4257041479	RES-PR MF 1/4W F 14.7R SMALL -
R51	4257046049	RES-PR MF 1/4W F 60.4R SMALL -
R52	4050533055	RES-CF 1/4W J 33R -AT- SMALL
R53	4050510055	RES-CF 1/4W J 10R -AT- SMALL
R54	4050522155	RES-CF 1/4W J 220R SMALL -AT-
R55	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R56	4050510055	RES-CF 1/4W J 10R -AT- SMALL
R57	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R58	4050533055	RES-CF 1/4W J 33R -AT- SMALL
R6	4050510055	RES-CF 1/4W J 10R -AT- SMALL
R60	4050510555	RES-CF 1/4W J 1M -AT- SMALL
R61	4050512355	RES-CF 1/4W J 12K -AT- SMALL
R64	4060247015	RES-CC 1/2W K 47R -AT-
R65	4050515255	RES-CF 1/4W J 1.5K SMALL -AT-
R66	4050162155	RES-CF 1/2W J 620R SMALL -AT-
R67	4050510355	RES-CF 1/4W J 10K -AT- SMALL
R68	4050547155	RES-CF 1/4W J 470R SMALL -AT-
R69	4060251315	RES-CC 1/2W K 51K -AT-
R7	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R70	4050527255	RES-CF 1/4W J 2.7K -AT- SMALL
R71	4050527255	RES-CF 1/4W J 2.7K -AT- SMALL
R72	4050522255	RES-CF 1/4W J 2.2K -AT- SMALL
R73	4050530455	RES-CF 1/4W J 300K SMALL -AT-
R74	4050510455	RES-CF 1/4W J 100K -AT- SMALL
R75	4050547355	RES-CF 1/4W J 47K -AT- SMALL
R77	4050533055	RES-CF 1/4W J 33R -AT- SMALL
R78	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R79	4050533055	RES-CF 1/4W J 33R -AT- SMALL
R8	4050533055	RES-CF 1/4W J 33R -AT- SMALL
R82	4050515255	RES-CF 1/4W J 1.5K SMALL -AT-
R83	4050510255	RES-CF 1/4W J 1K -AT- SMALL
R84	4050510555	RES-CF 1/4W J 1M -AT- SMALL
R85	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R86	4050510155	RES-CF 1/4W J 100R -AT- SMALL
R87	4050522455	RES-CF 1/4W J 220K SMALL -AT-
R88	4050522255	RES-CF 1/4W J 2.2K -AT- SMALL
R90	4257042401	RES-PR MF 1/4W F 2.4K AT SMALL
R91	4050510155	RES-CF 1/4W J 100R -AT- SMALL

REF.	PART NO.	DESCRIPTION
R98	4050515255	RES-CF 1/4W J 1.5K SMALL -AT-
R99	4050522255	RES-CF 1/4W J 2.2K -AT- SMALL
SG7	5106152304	SPARK GAP 1.5KV AG-15 P:6.4mm
ZD70	41205051AU	DIODE ZENER MTZJ5.1A -AT-
ZD71	41205051AU	DIODE ZENER MTZJ5.1A -AT-
ZD72	41205004A2	DIODE ZENER HZ4A2 -AT-
ZD73	41205051AU	DIODE ZENER MTZJ5.1A -AT-
ZD74	41205009C1	DIODE ZENER HZ9C1 -AT-
ZD75	41205051AU	DIODE ZENER MTZJ5.1A -AT-

9.4. Control Board

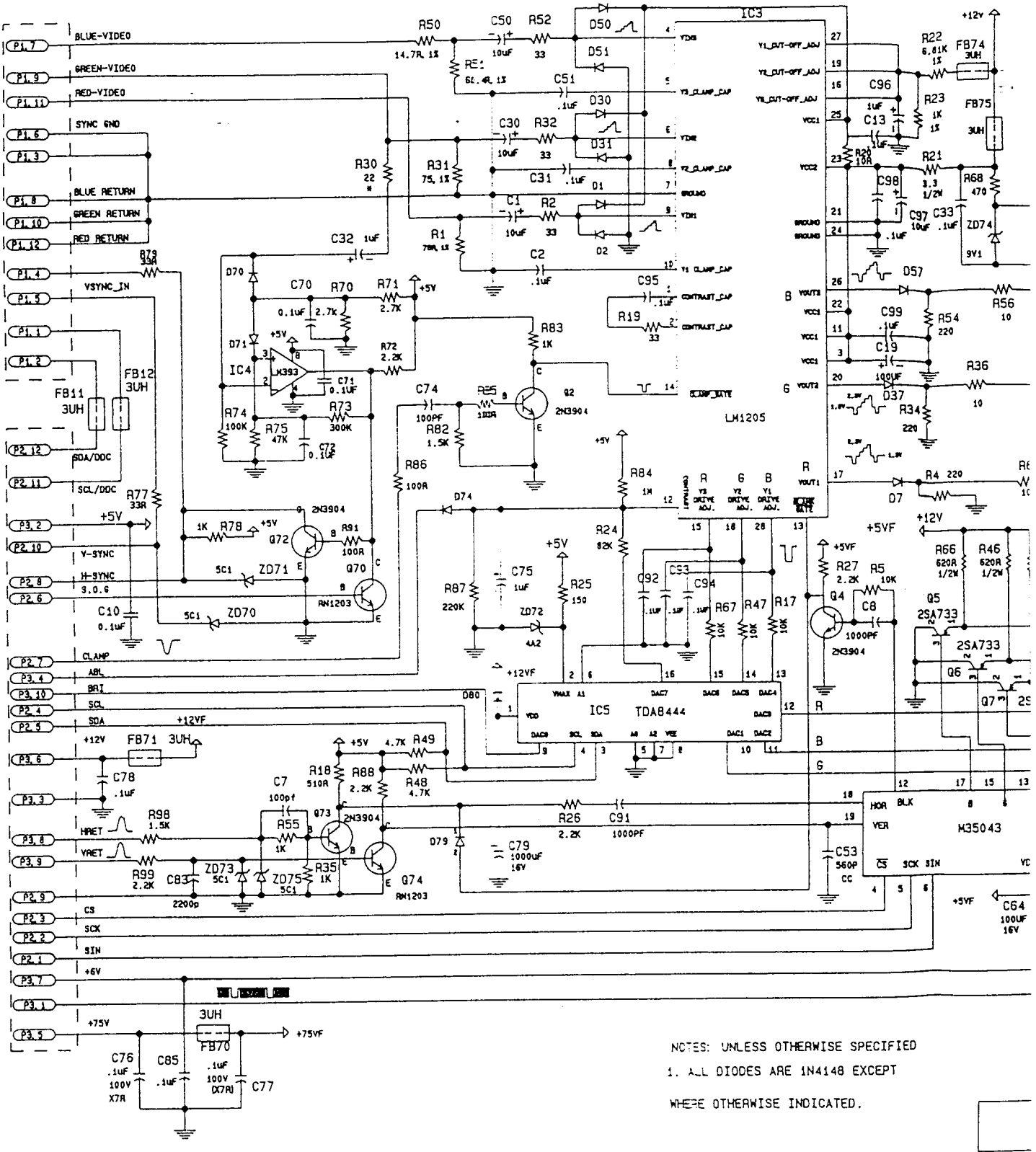
REF.	PART NO.	DESCRIPTION
	RH7H110444 -V	CONTROL PCB ASS'Y
	4141116501	#P.C.B CONTROL
	4410464000	ROTARY SWITCH 3315C-PD3-016 3P
	C488100026	CONN. 10P & WIRE ASS'Y 200mm
LD201	4120664630	LED LT6463-23-D5115¢ G/Y
S801	4410604040	KEYSWITCH TACT SKHHAM2520 1KEY
S802	4410604040	KEYSWITCH TACT SKHHAM2520 1KEY
S803	4410604040	KEYSWITCH TACT SKHHAM2520 1KEY
S804	4410604040	KEYSWITCH TACT SKHHAM2520 1KEY

9.5. HITACHI CRT Different List

REF.	PART NO.	DESCRIPTION
C125	5074123104	0.012UF/400V .MEF
C316	5195432573	4300PF/1600V .PMHA
C319	5195274543	0.27UF/400V .PMHA
C320	5190724583	0.72UF/250V .MPP
C322	5190224543	0.22UF/400V .MPP
C362	5190224543	0.22UF/400V .MPP
C367	5190564583	0.56UF/250V .MPP
J285	(NC)	
J286	5406100000	JUMP WIRE
J287	5406100000	JUMP WIRE
J288	(NC)	
L304	708S207H10	LINEARITTY(20 1/2T)
L305	4323900103	90UH
R234	4050568355	68K
R334	4172010953	1R/2W
R364	4050512355	12K
R395	4050112155	120R 1/2W
R3A6	4050515355	15K
R3A8	4050513455	130K
R3B9	4050527255	2.7K
R610	4050527355	27K
R611	4050556255	5.6K
R612	4050539255	3.9K
Q902	41035010K0	FS10KM-12/FS10TM-12/2SK1723
	41035010T0	
	4101517230	
FOR YOKE PCB		(NC)

9.6. TOSHIBA CRT Different List

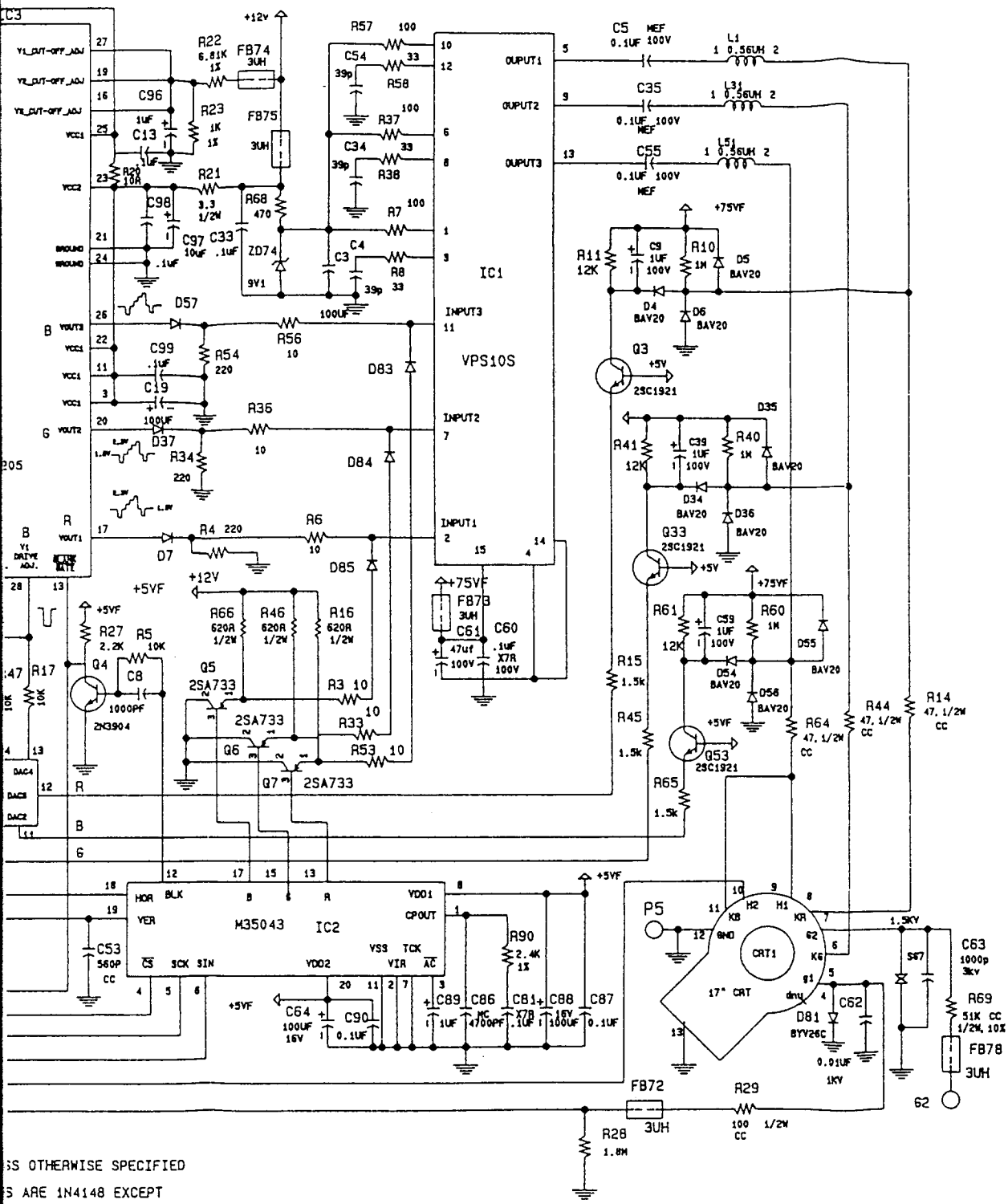
REF.	PART NO.	DESCRIPTION
C125	5092912565	0.0091UFJ/630V .PP
C316	5195472573	0.0047UF/1.6KV .PMHA
C319	5195304543	0.3UF/400V .PMHA
C320	5190754583	0.75UF/250V .MPP
C322	5190274543	0.27UF/400V .MPP
C362	5190244543	0.24UF/400V .MPP
C367	5190824583	0.82UF/250V .MPP
J285	5406100000	JUMP WIRE
J286	(NC)	
J287	(NC)	
J288	5406100000	JUMP WIRE
L304	708S257H10	LINEARITY (19 1/2T)
L305	4323500003	50UH
R234	4050582355	82K
R334	4172082853	0.82R/2W
R364	4050582255	8.2K
R395	4050175055	75R 1/2W
R3A6	4050582255	8.2K
R3A8	4050520455	200K
R3B9	4050539255	3.9K
R610	4050536355	36K
R611	4050510355	10K
R612	4050556255	5.6K
Q902	4101517230	2SK1723
	SS7H100130 -404	FOR YOKE PCB ASS'Y (NC)



NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL DIODES ARE 1N4148 EXCEPT

WHERE OTHERWISE INDICATED.



SS OTHERWISE SPECIFIED

S ARE 1N4148 EXCEPT

ISE INDICATED.

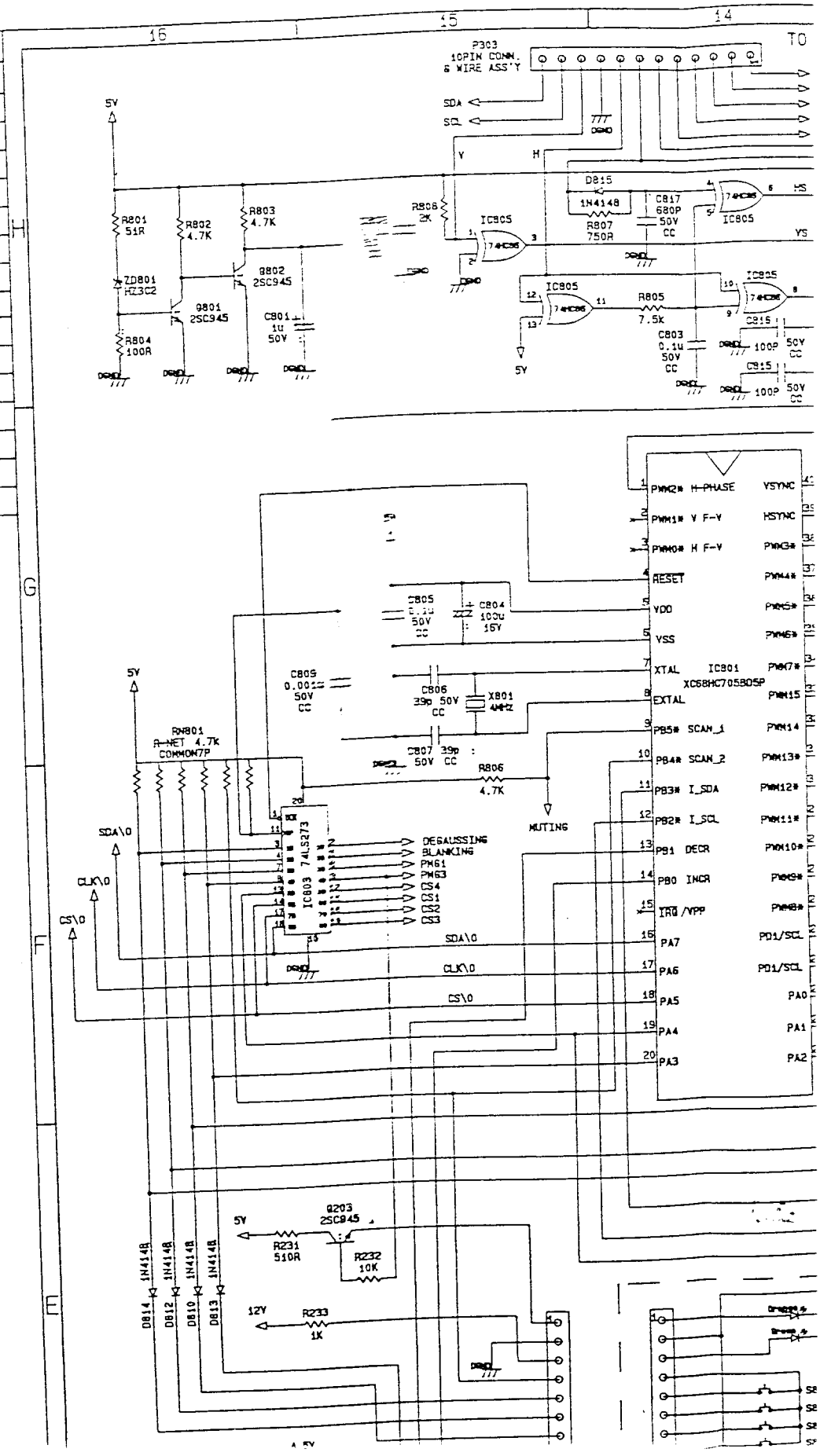
Taxan (Europe) Ltd.

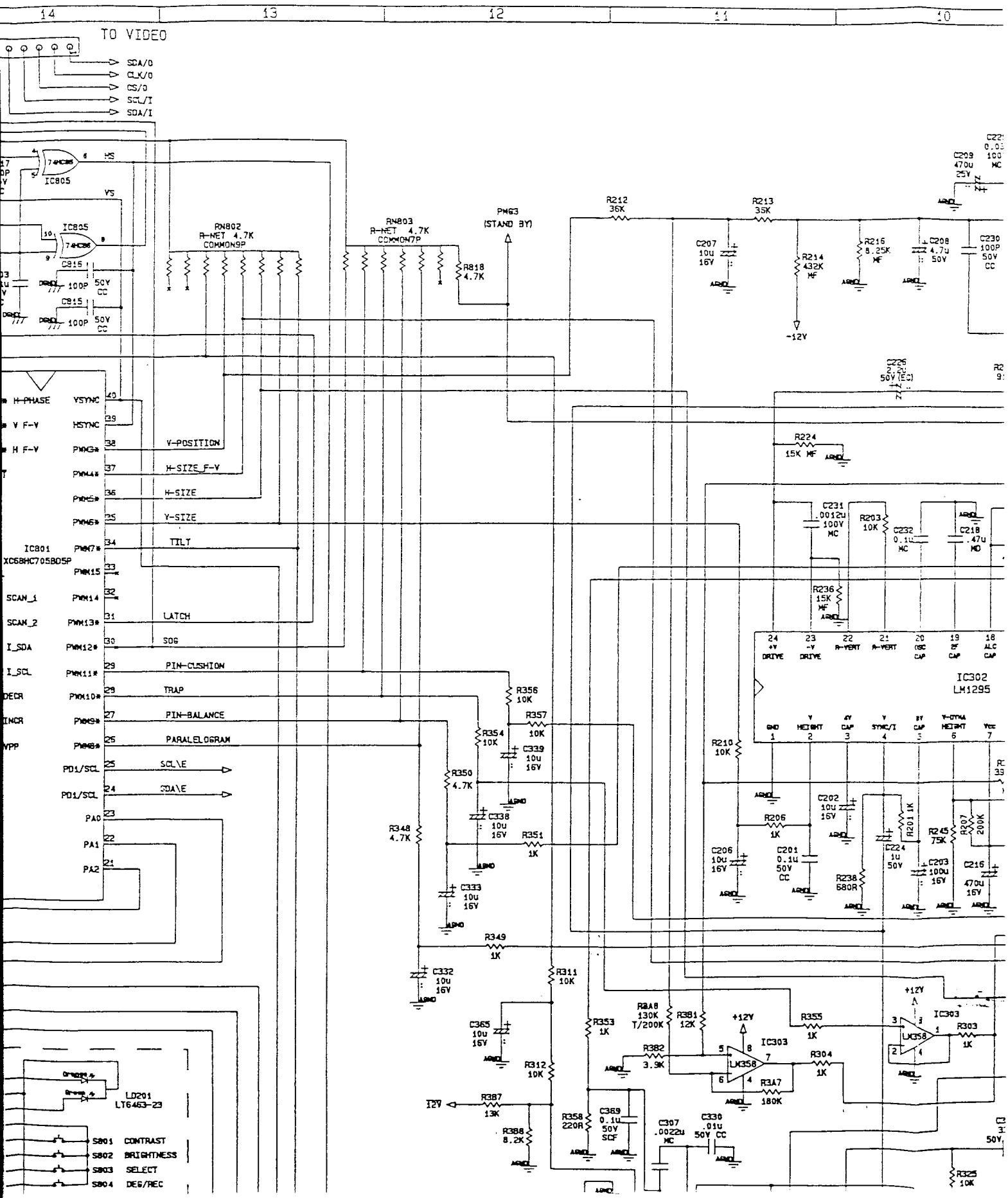
Drawing Date	Tolerance		Scale	Unit
03-14-'96	Dim	Angle		
	+ -	+ -		

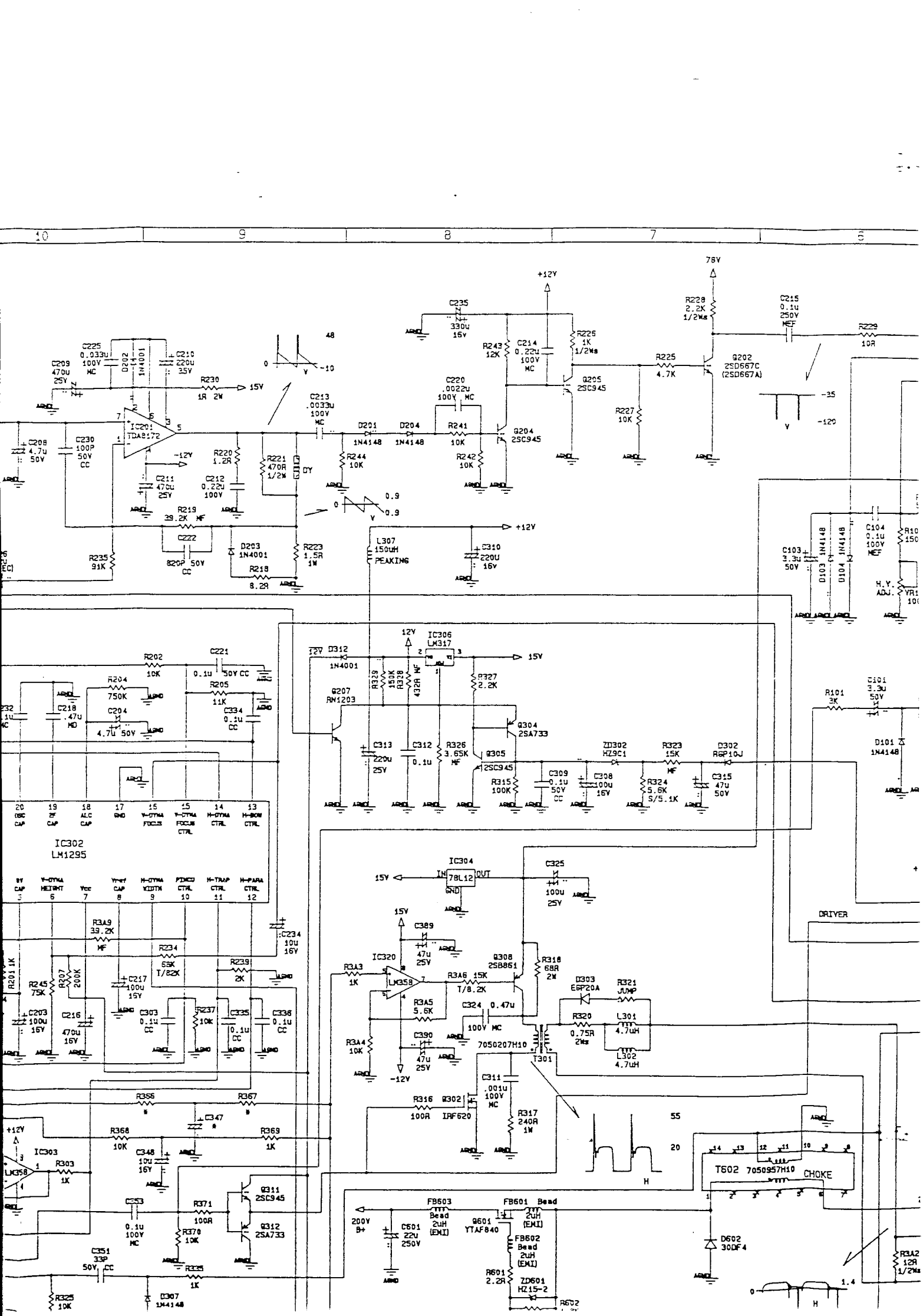
Drawer	Sheet	Drawing Name	Filename
LIN	1 of 1	VIDEO	EV74XX2A

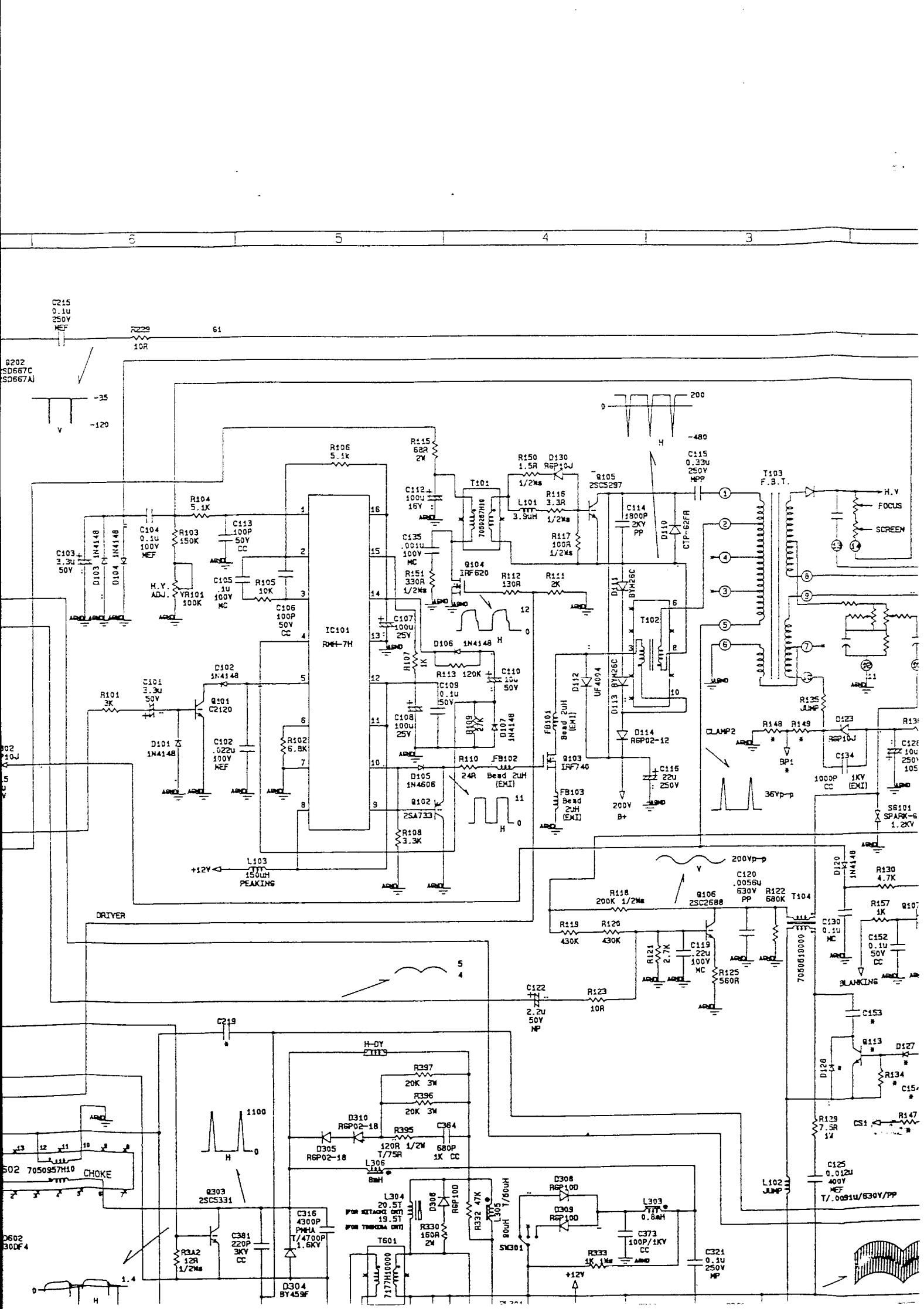
Model No. **Ergovision 740 LR / TCO**

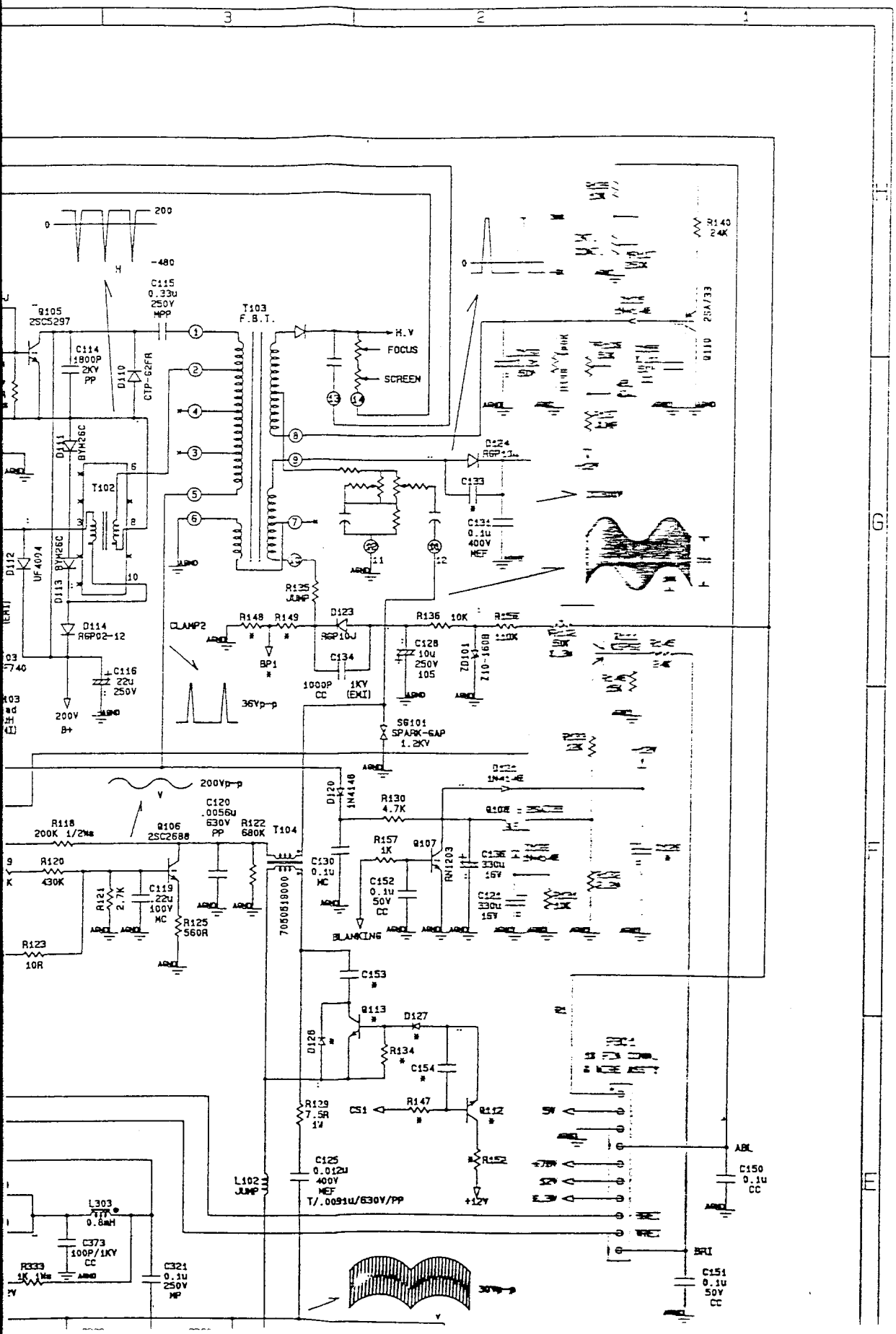
DATE	ECN/ECO NO.
03-14-'96	0-03129601ET
03-15-'96	0-02149603ET
03-26-'96	0-03019601ET
03-28-'96	0-03259609ET
03-28-'96	0-03259608ET
04-11-'96	0-04029601ET
04-11-'96	0-03199607ET
04-11-'96	0-03089603ET
04-26-'96	N-02109601EG
05-15-'96	0-05039603RC

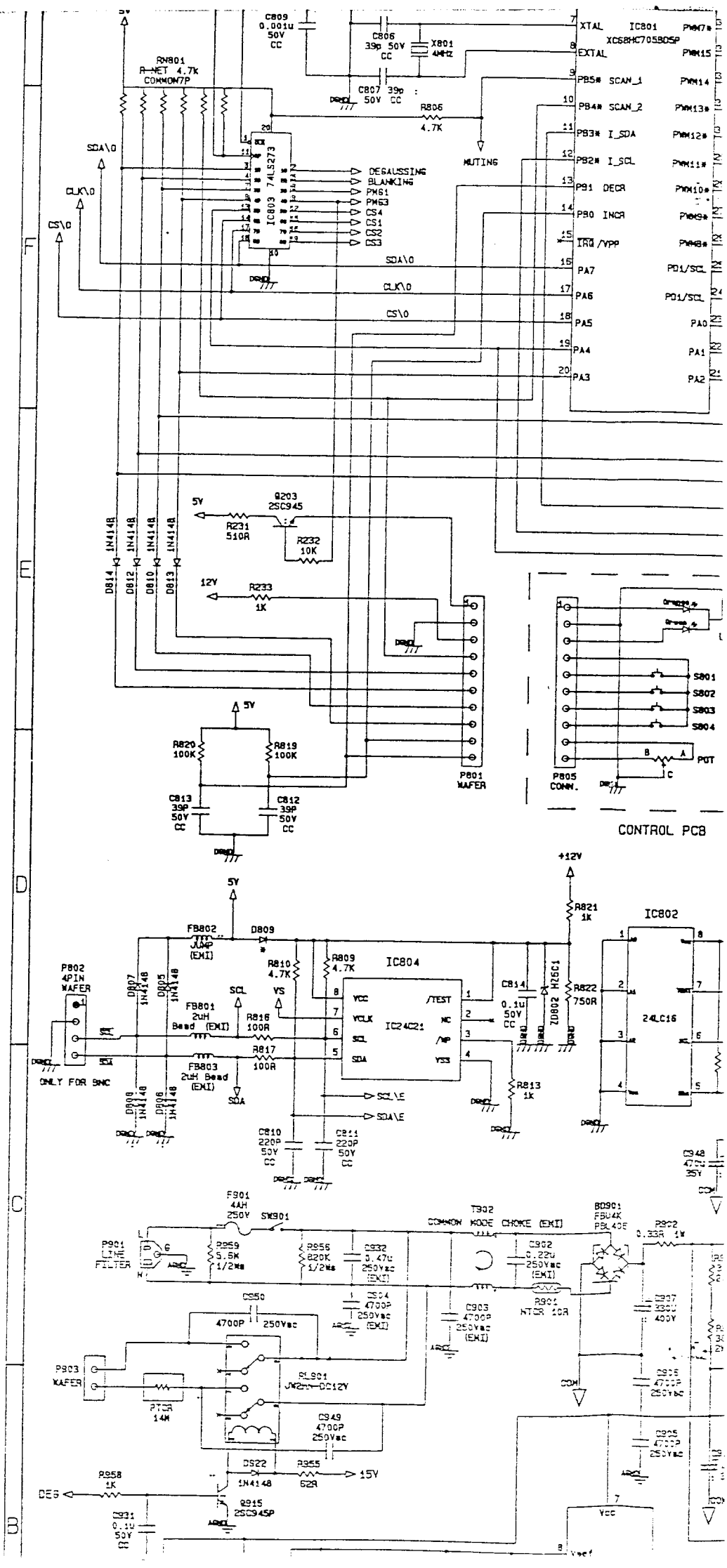


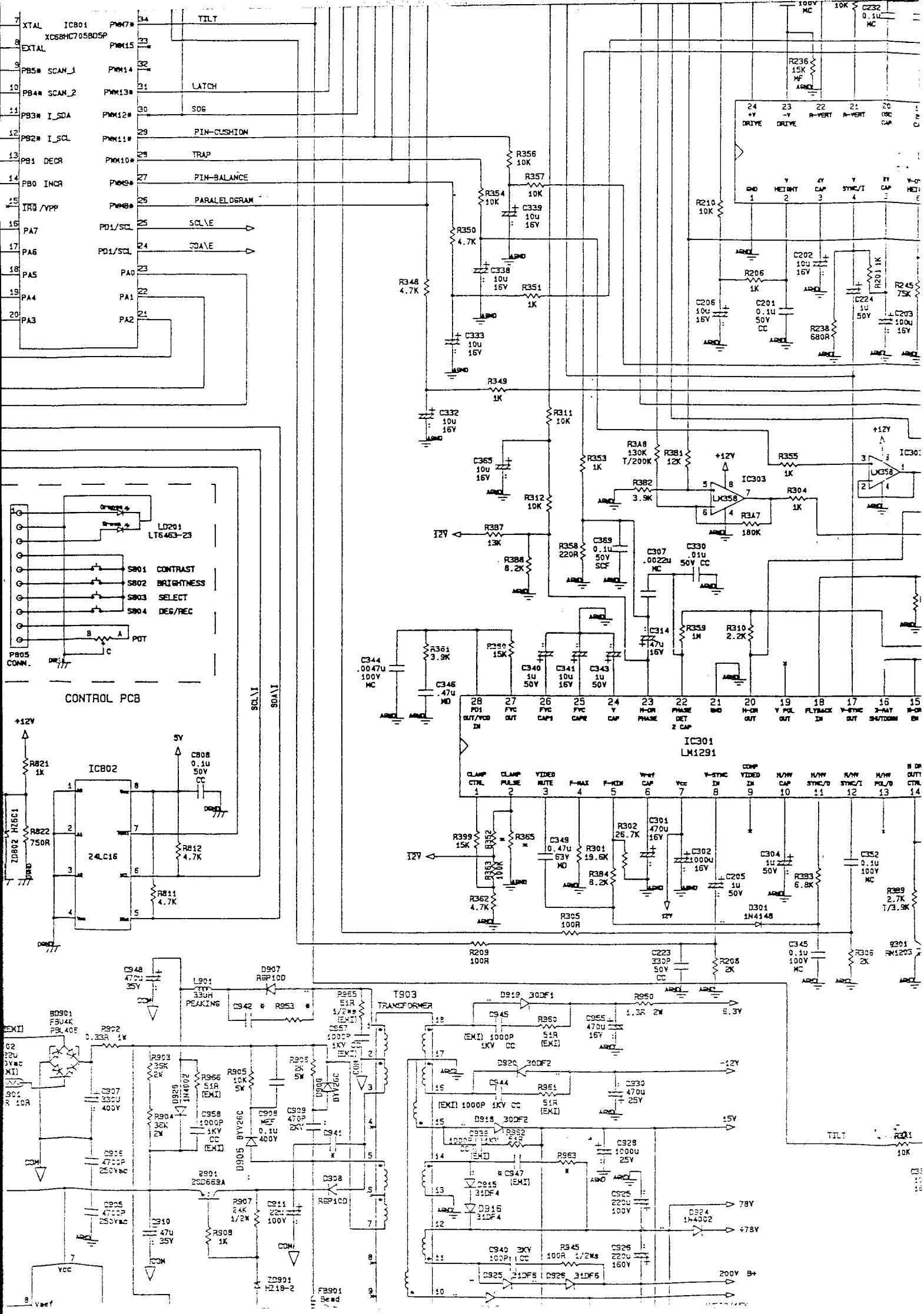

14
13
12
11
10
TO VIDEO
SDA/O
CLK/O
CS/O
SCL/I
SDA/I
IC805
74HC86
HS
VS
RN802
R-NET 4.7K
COMMON9P
RN803
R-NET 4.7K
COMMON7P
PWR3
(STAND BY)
R818
4.7K
R212
36K
R213
35K
C207
10u
16V
R214
432K
MF
-12V
R216
8.25K
MF
C208
4.7u
50V
C230
100P
50V
CC
C209
470u
25V
C815
100P
50V
CC
H-PHASE
V F-V
H F-V
IC801
XC68HC705B05P
VSYNC
HSYNC
PWM3*
PWM4*
PWM5*
PWM6*
PWM7*
PWM15
PWM14
PWM13*
PWM12*
PWM11*
PWM10*
PWM9*
PWM8*
PD1/SCL
PD1/SCL
PA0
PA1
PA2
V-POSITION
H-SIZE_F-V
H-SIZE
Y-SIZE
TILT
LATCH
SOG
PIN-CUSHION
TRAP
PIN-BALANCE
PARALELOGRAM
SCL\E
SDA\E
SCAN_1
SCAN_2
I_SDA
I_SCL
DECR
INCR
VPP
R224
15K MF
C231
.0012u
100V
MC
R203
10K
C232
0.1u
MC
C218
.47u
MD
R236
15K
MF
IC302
LM1295
R210
10K
R206
1K
C206
10u
16V
C201
0.1u
50V
CC
C202
10u
16V
R201 1K
R238
680R
C224
1u
50V
R245
75K
R207
200K
C203
100u
16V
C216
470u
16V
R356
10K
R357
10K
R354
10K
C339
10u
16V
R350
4.7K
C338
10u
16V
R348
4.7K
R351
1K
C333
10u
16V
R349
1K
C332
10u
16V
R311
10K
C365
10u
16V
R312
10K
R387
13K
R388
8.2K
R353
1K
R8A8
130K
T/200K
R381
12K
+12V
R355
1K
IC303
LM358
R382
3.9K
R3A7
180K
R304
1K
R303
1K
R358
220R
C369
0.1u
50V
SCF
C307
.00022u
MC
C330
.01u
50V CC
R325
10K
LD201
LT6463-23
S801 CONTRAST
S802 BRIGHTNESS
S803 SELECT
S804 DEG/REC

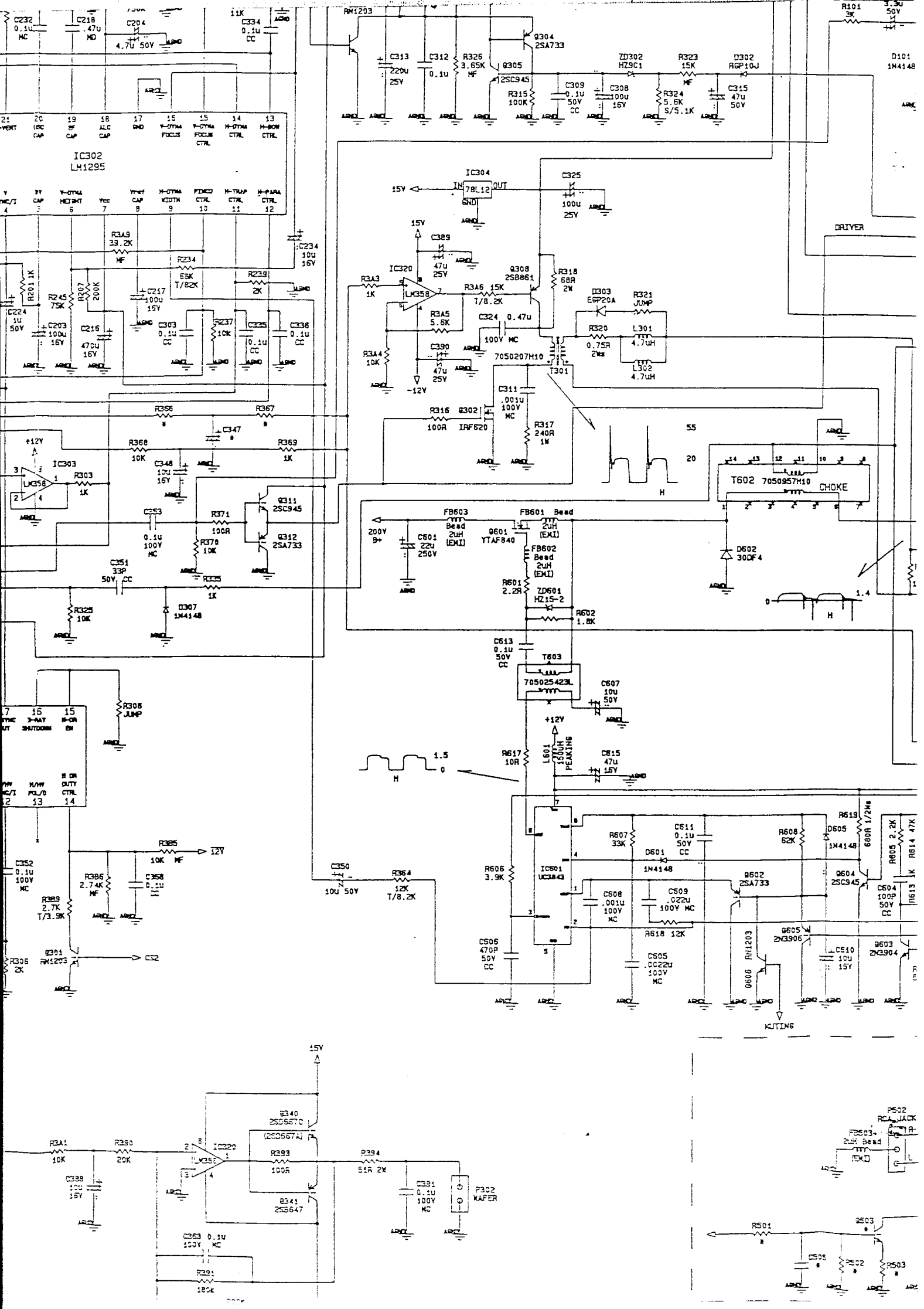

10
9
8
7
78V
+12V
C235 330u 16v
R228 2.2K 1/2Ws
C215 0.1u 250V MEF
R229 10R
R225 1K 1/2Ws
R225 4.7K
Q202 2SD667C (2SD667A)
Q205 2SC945
R227 10K
C225 0.033u 100V MC
C209 470u 25V
C210 220u 35V
D202 1N4001
R230 1R 2W
15V
C213 .0033u 100V MC
C220 .0022u 100V MC
R243 12K
C214 0.22u 100V MC
IC201 TDA8172
C208 4.7u 50V
C230 100P 50V CC
-12V
C211 470u 25V
C212 0.22u 100V
R220 1.2R
R221 470R 1/2W
DY
D201 1N4148
D204 1N4148
R241 10K
R242 10K
R244 10K
Q204 2SC945
R219 39.2K MF
C222 820P 50V CC
D203 1N4001
R223 1.5R 1W
R218 8.2R
R235 91K
L307 150uH PEAKING
C310 220U 16v
+12V
C103 3.3u 50V
D103 1N4148
D104 1N4148
C104 0.1u 100V MEF
H.Y. ADJ.
R202 10K
C221 0.1u 50V CC
R204 750K
R205 11K
C218 .47u MD
C204 4.7u 50V
C334 0.1u CC
12V
IC306 LM317
D312 1N4001
15V
R339 150K
R338 432R MF
R327 2.2K
Q207 RN1203
Q304 2SA733
C313 220u 25V
C312 0.1u
R326 3.65K MF
Q305 2SC945
ZD302 HZ9C1
R323 15K MF
D302 RGP10J
R315 100K
C309 0.1u 50V CC
C308 100u 16V
R324 5.6K S/5.1K
C315 47u 50V
R101 3K
C101 3.3u 50V
D101 1N4148
20 OSC CAP
19 2F CAP
18 ALC CAP
17 GND
16 V-DYNA FOCUS
15 V-DYNA FOCUS CTRL
14 H-DYNA CTRL
13 H-BOW CTRL
IC302 LM1295
BY CAP
V-DYNA HEIGHT
Vcc
Vref CAP
H-DYNA WIDTH
FOCUS CTRL
H-TRAP CTRL
H-PARA CTRL
IC304 78L12
IN OUT GND
C325 100u 25V
15V
C389 47u 25V
R3A9 39.2K MF
R234 55K T/82K
C234 10u 16V
R239 2K
R201 1K
R245 75K
R207 200K
C217 100u 15V
C203 100u 16V
C216 47u 16V
C303 0.1u CC
R237 10K
C335 0.1u CC
C336 0.1u CC
IC320 LM358
R3A3 1K
R3A6 15K T/8.2K
R3A5 5.6K
R3A4 10K
Q308 2SB861
R318 68R 2W
D303 EGP20A
R321 JUMP
R320 0.75R 2Ws
L301 4.7uH
L302 4.7uH
C324 0.47u 100V MC
C390 47u 25V
-12V
7050207H10
T301
DRIVER
C311 .001u 100V MC
R316 100R
Q302 IRF620
R317 240R 1W
55
20
H
R356
R367
C347
R368 10K
R369 1K
C348 10u 16V
IC303 LM358
R303 1K
C253 0.1u 100V MC
R371 100R
Q311 2SC945
Q312 2SA733
R370 10K
C351 33P 50V CC
R335 1K
R325 10K
D307 1N4148
T602 7050957H10 CHOKE
FB603 Bead 2uH (EMI)
FB601 Bead 2uH (EMI)
200V B+
C601 22u 250V
Q601 YTAF840
FB602 Bead 2uH (EMI)
R601 2.2R
ZD601 HZ15-2
R602
D602 30DF4
R3A2 12R 1/2Ws
1.4
H

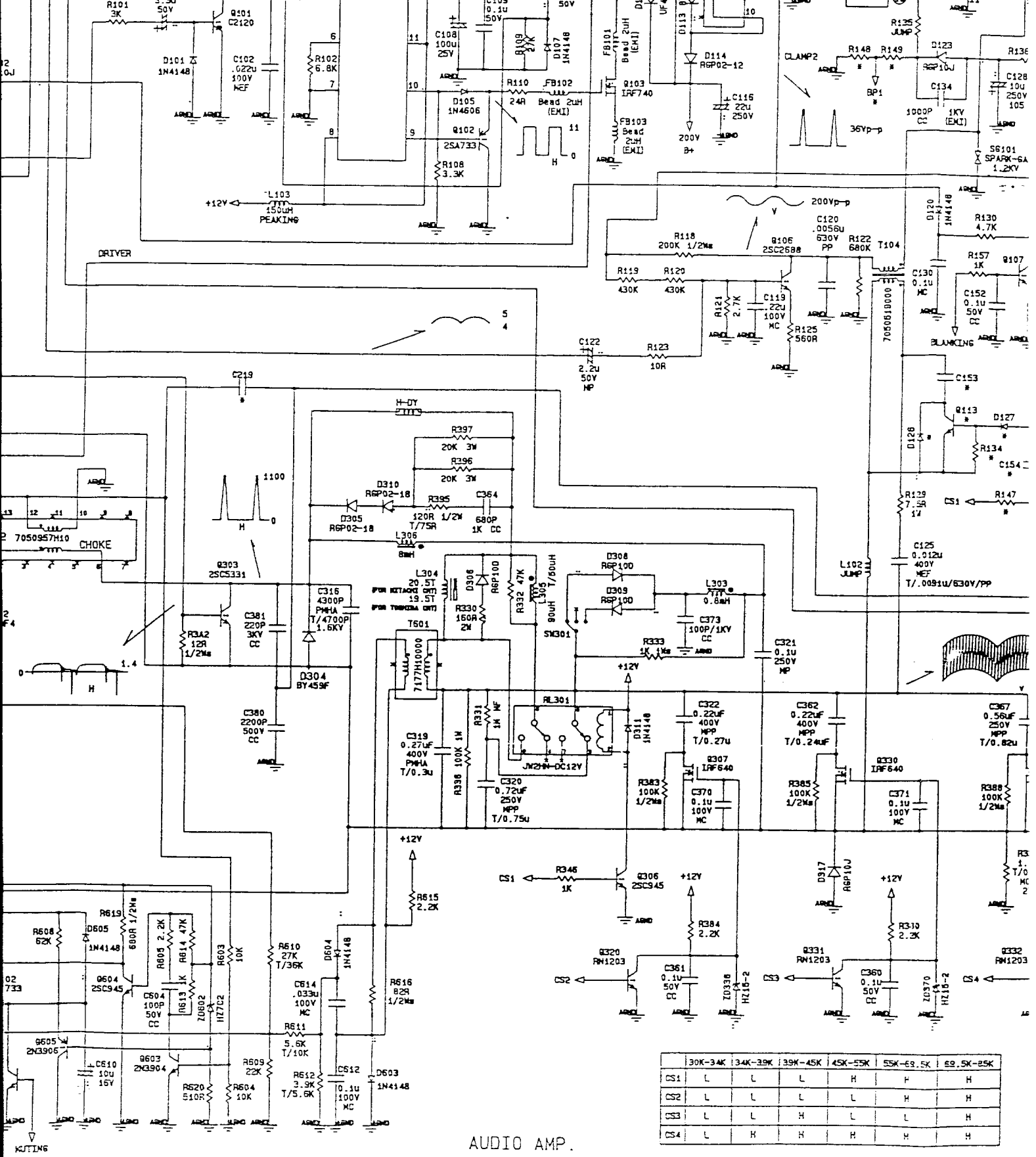

C215 0.1u 250V MEF
R229 10R
Q202 SD667C SD667A
-35
-120
V
200
0
H
-480
R106 5.1K
R115 68R 2W
R150 1.5R 1/2W
D130 RGP10J
C115 0.33u 250V MPP
Q105 2SC5297
T103 F.B.T.
H.V
FOCUS
SCREEN
R104 5.1K
C104 0.1u 100V MEF
R103 150K
C113 100P 50V CC
C103 3.3u 50V
D103 1N4148
D104 1N4148
H.V. ADJ.
VR101 100K
C105 .1u 100V MC
R105 10K
C106 100P 50V CC
C112 100u 16V
T101
R116 3.3R 1/2W
L101 3.9uH
C114 1800P 2KV PP
D110 CTP-62FR
C135 .001u 100V MC
R151 330R 1/2W
Q104 IRF620
R112 130R
R111 2K
D111 BYW26C
T102
IC101 RM4-7H
C107 100u 25V
D106 1N4148
R107 1K
R113 120K
C110 10u 50V
C109 0.1u 50V
R109 27K
D107 1N4148
D102 1N4148
R101 3K
C101 3.3u 50V
Q101 C2120
D101 1N4148
C102 .022u 100V MEF
R102 6.8K
D105 1N4606
R110 24R
FB102 Bead 2uH (EMI)
Q102 2SA733
R108 3.3K
FB101 Bead 2uH (EMI)
D112 UF4004
D113 BYW26C
D114 RGP02-12
Q103 IRF740
FB103 Bead 2uH (EMI)
C116 22u 250V
200V B+
R135 JUMP
R148
R149
D123 RGP10J
CLAMP2
BP1
C134 1000P CC
1KV (EMI)
36Vp-p
SG101 SPARK-G 1.2KV
+12V
L103 150uH PEAKING
DRIVER
V
200Vp-p
C120 .0056u 630V PP
R118 200K 1/2W
Q106 2SC2688
R122 680K
T104
R119 430K
R120 430K
R121 2.7K
C119 .22u 100V MC
R125 560R
D120 1N4148
R130 4.7K
R157 1K
C130 0.1u MC
C152 0.1u 50V CC
BLANKING
7050610000
C122 2.2u 50V NP
R123 10R
5
4
C219
H-DY
R397 20K 3W
R396 20K 3W
D310 RGP02-18
R395 120R 1/2W T/75R
C364 680P 1K CC
D305 RGP02-18
L306 8mH
1100
H
0
Q303 2SC5331
CHOKE
7050957H10
C316 4300P PMMA T/4700P 1.6KV
C381 220P 3KV CC
R3A2 12R 1/2W
D304 BY459F
L304 20.5T (FOR KITACHO CRT) 19.5T (FOR TOSHIBA CRT)
D306 RGP100
R330 150R 2W
T601
7177H10000
R332 47K
L305 T/60uH
90uH
SW301
D308 RGP100
D309 RGP100
L303 0.8mH
C373 100P/1KV CC
R333 1K 1W
+12V
C321 0.1u 250V MP
L102 JUMP
C125 0.012u 400V MEF T/.0091u/630V/PP
R129 7.5R 1W
CS1
R147
C153
Q113
D127
R134
D128
1.4
0
H

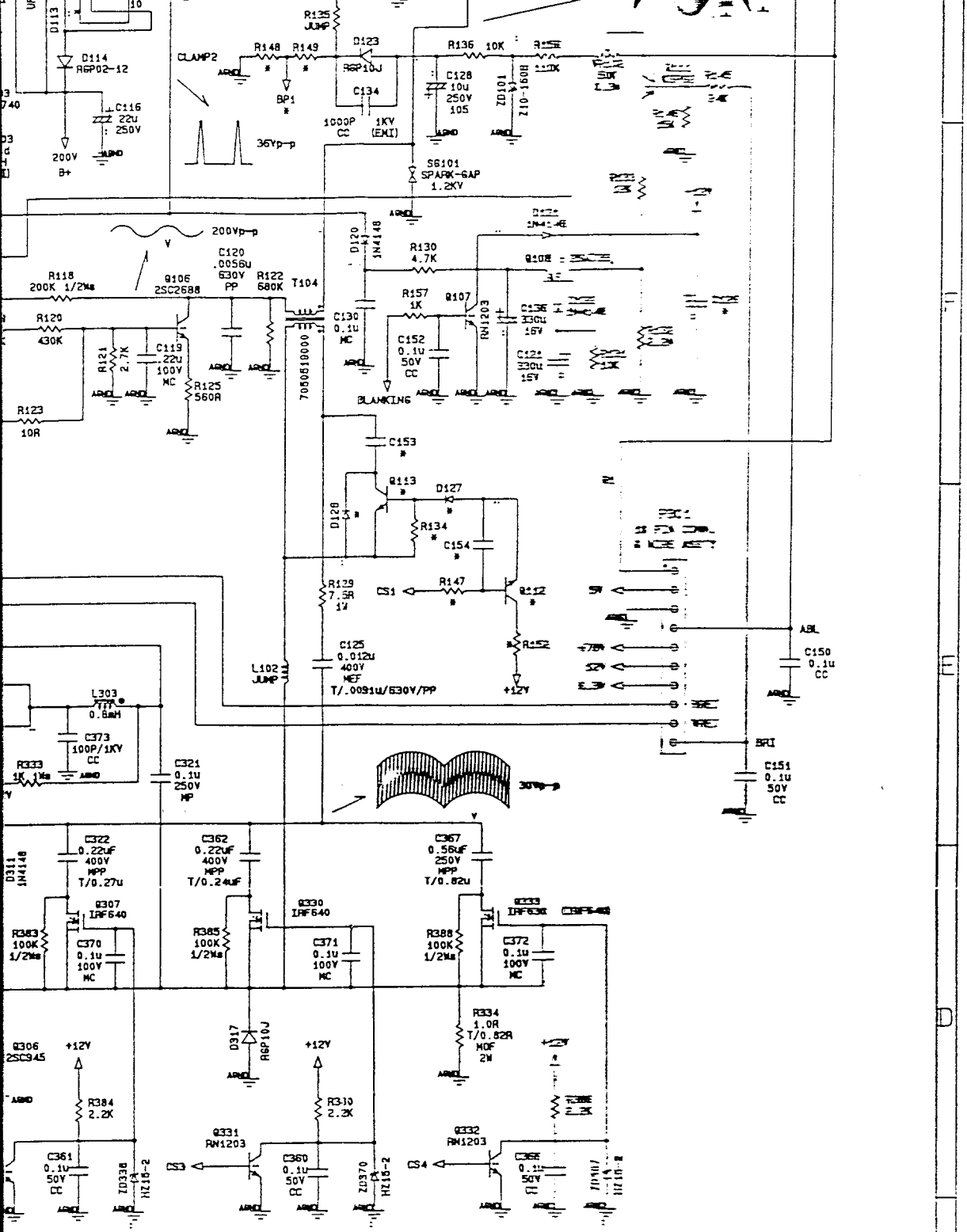

Q105
2SC5297
C115
0.33u
250V
MPP
T103
F.B.T.
H.V
FOCUS
SCREEN
C114
1800P
2KV
PP
D110
CTP-G2FR
D111
BYW26C
T102
D112
UF4004
D113
BYW26C
D114
RGP02-12
C116
22u
250V
200V
B+
D124
RGP10J
C133
C134
0.1u
400V
MEF
R135
JUMP
CLAMP2
R148
R149
D123
RGP10J
R136
10K
C128
10u
250V
105
ZD101
Z10-1608
C134
1000P
CC
1KV
(EXT)
36Vp-p
SG101
SPARK-GAP
1.2KV
200Vp-p
D120
1N4148
R130
4.7K
R118
200K 1/2W
Q106
2SC2688
R122
680K
T104
R120
430K
C120
.0056u
630V
PP
C130
0.1u
MC
R157
1K
Q107
C136
330u
16V
C152
0.1u
50V
CC
BLANKING
R121
2.7K
C119
.22u
100V
MC
R125
560R
R123
10R
7050819000
C153
Q113
D127
D126
R134
C154
R129
7.5R
1W
CS1
R147
Q112
R152
+12V
L102
JUMP
C125
0.012u
400V
MEF
T/.0091u/630V/PP
ABL
C150
0.1u
CC
BRI
C151
0.1u
50V
CC
L303
0.8mH
C373
100P/1KV
CC
R333
1K
C321
0.1u
250V
MP
30Vp-p
R140
24K
Q110
2SA733


IC801
XC68HC705B5DSP
XTAL
EXTAL
PB5# SCAN_1
PB4# SCAN_2
PB3# I_SDA
PB2# I_SCL
PB1 DECR
PB0 INCR
IRQ /VPP
PA7
PA6
PA5
PA4
PA3
PWM7#
PWM15
PWM14
PWM13#
PWM12#
PWM11#
PWM10#
PWM9#
PWM8#
PD1/SCL
PD1/SCL
PA0
PA1
PA2
C809 0.001u 50V CC
C806 39p 50V CC
X801 4MHz
C807 39p 50V CC
RN801 R-NET 4.7k COMMON7P
R806 4.7K
MUTING
SDA\0
CLK\0
CS\0
IC803 74LS273
DEGAUSSING
BLANKING
PM61
PM63
CS4
CS1
CS2
CS3
Q203 2SC945
R231 510R
R232 10K
R233 1K
D814 1N4148
D812 1N4148
D810 1N4148
D813 1N4148
R820 100K
R819 100K
C813 39P 50V CC
C812 39P 50V CC
P801 WAFER
S801
S802
S803
S804
POT
P805 CONN.
CONTROL PCB
+12V
R821 1k
IC802
24LC16
FB802 JUMP (EXI)
D809
R810 4.7K
R809 4.7K
IC804
IC24C21
/TEST
VCLK
SCL
SDA
NC
/WP
VSS
C814 0.1u 50V CC
ZD802 HZ5C1
R822 750R
R813 1k
P802 4PIN WAFER
ONLY FOR 9NC
D807 1N4148
D805 1N4148
FB801 2uH Bead (EXI)
R816 100R
R817 100R
FB803 2uH Bead (EXI)
D808 1N4148
D806 1N4148
SCL\E
SDA\E
C810 220P 50V CC
C811 220P 50V CC
C948 470u 35V
FB901 4AH 250V
SW901
T902 COMMON MODE CHOKE (EXI)
BD901 FBU4K FBL40E
P902 0.33R 1W
P901 LINE FILTER
R959 5.6M 1/2W
R956 820K 1/2W
C932 0.47u 250Vac (EXI)
C902 0.22u 250Vac (EXI)
C950 4700P 250Vac
C924 4700P 250Vac (EXI)
C903 4700P 250Vac (EXI)
R901 NTCR 10R
C907 330u 400V
C905 4700P 250Vac
P903 WAFER
PTCR 14M
RL901 JW2SN-DC12V
C949 4700P 250Vac
DS22 1N4148
R955 62R
15V
R958 1K
DEG
R915 2SC945P
C931 0.1u 50V CC
Vcc
Vref


IC801
XC68HC705BD5P
XTAL
EXTAL
PB5* SCAN_1
PB4* SCAN_2
PB3* I_SDA
PB2* I_SCL
PB1 DECR
PB0 INCR
IRQ /VPP
PA7
PA6
PA5
PA4
PA3
PWM7*
PWM15
PWM14
PWM13*
PWM12*
PWM11*
PWM10*
PWM9*
PWM8*
PD1/SCL
PD1/SCL
PA0
PA1
PA2
TILT
LATCH
SDG
PIN-CUSHION
TRAP
PIN-BALANCE
PARALELOGRAM
SCL\E
SDA\E
LD201
LT6463-23
S801 CONTRAST
S802 BRIGHTNESS
S803 SELECT
S804 DEG/REC
POT
P805
CONN.
CONTROL PCB
SCL\E
SDA\E
IC802
24LC16
ZD802 HZ6C1
IC301
LM1291
IC303
LM358
+12V
5V
12V
-12V
15V
78V
+78V
200V B+
T903
TRANSFORMER
D901
D902
D903
D904
D905
D906
D907
D908
D909
D910
D911
D912
D913
D914
D915
D916
D917
D918
D919
D920
D921
D922
D923
D924
D925
D926
Q901
2SD669A
L901
33uH
PEAKING
FB901
Bead
ZD901
H218-2
TILT

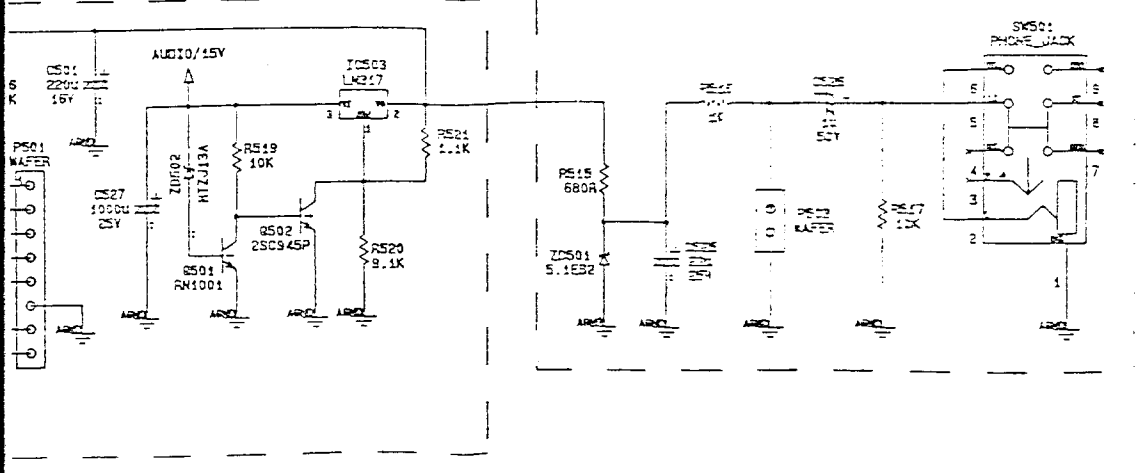

IC302
LM1295
IC304
78L12
IC320
LM358
IC303
LM358
IC601
UC3843
T602 7050957H10
CHOKE
T603
705025423L
T301
7050207H10
DRIVER
KUTING
+12V
-12V
15V
200V B+
PEAKING
FB603 Bead 2uH (EXI)
FB601 Bead 2uH (EXI)
FB602 Bead 2uH (EXI)
Q601 YTAF840
Q602 2SA733
Q603 2N3904
Q604 2SC945
Q605 2N3906
Q606 RN1203
Q301 RN1203
Q302 IRF620
Q303 EGP20A
Q304 2SA733
Q305 2SC945
Q308 2SB861
Q309 2SC945
Q311 2SC945
Q312 2SA733
Q340 2SD667C
Q341 2SB647
D302 RGP10J
D303 EGP20A
D307 1N4148
D601 1N4148
D602 30DF4
D605 1N4148
ZD302 HZ9C1
ZD601 HZ15-2
L301 4.7uH
L302 4.7uH
L601 1500UH
P302 WAFER
P502 RCA JACK
R618 12K
R501
C505
C502
C503
C504
C505 .0022u 100V MC
C506 470P 50V CC
C607 10u 50V
C608 .001u 100V MC
C609 .022u 100V MC
C610 10u 15V
C611 0.1u 50V CC
C613 0.1u 50V CC
C815 47u 16V
R606 3.9K
R607 33K
R608 62K
R613 600R 1/2W
R614 47K
R615 1K
R617 10R
R602 1.8K
R601 2.2R
R605 2.2K
R604 100P 50V CC
R613 1K
R101 3K
R306 JUMP
R307 2K
R308 JUMP
R309 2.7K T/3.9K
R325 10K MF
R326 3.65K MF
R315 100K
R323 15K MF
R324 5.6K S/5.1K
R318 68R 2W
R320 0.75R 2W
R321 JUMP
R316 100R
R317 240R 1W
R343 1K
R3A5 5.6K
R3A6 15K T/8.2K
R3A4 10K
R3A9 33.2K MF
R234 65K T/82K
R239 2K
R201 1K
R207 200K
R245 75K
R224 1u 50V
R303 1K
R368 10K
R369 1K
R371 100R
R378 10K
R335 1K
R385 10K MF
R386 2.74K MF
R364 12K T/8.2K
R3A1 10K
R390 20K
R393 100R
R394 51R 2W
R391 180K
C232 0.1u MC
C218 .47u MD
C204 4.7u 50V
C334 0.1u CC
C234 10u 16V
C217 100u 16V
C203 100u 16V
C216 470u 16V
C303 0.1u CC
C237 10K
C335 0.1u CC
C338 0.1u CC
C389 47u 25V
C390 47u 25V
C324 0.47u 100V MC
C325 100u 25V
C311 .001u 100V MC
C313 220u 25V
C312 0.1u
C308 100u 16V
C315 47u 50V
C347
C348 10u 16V
C353 0.1u 100V MC
C351 33P 50V CC
C325 1K
C350 10u 50V
C352 0.1u 100V MC
C358 0.1u
C388 10u 15V
C363 0.1u 100V MC
C331 0.1u 100V MC
R356
R367
R305 2K
R325 10K
R335 1K
R3A4 10K
R3A5 5.6K
R3A6 15K T/8.2K
R3A9 33.2K MF
R3A1 10K
R390 20K
R393 100R
R394 51R 2W
R391 180K
R501
C505
C502
C503
C504
P502 RCA JACK
P302 WAFER
FB603 Bead 2uH (EXI)
55
20
1.4
0
1.5
H

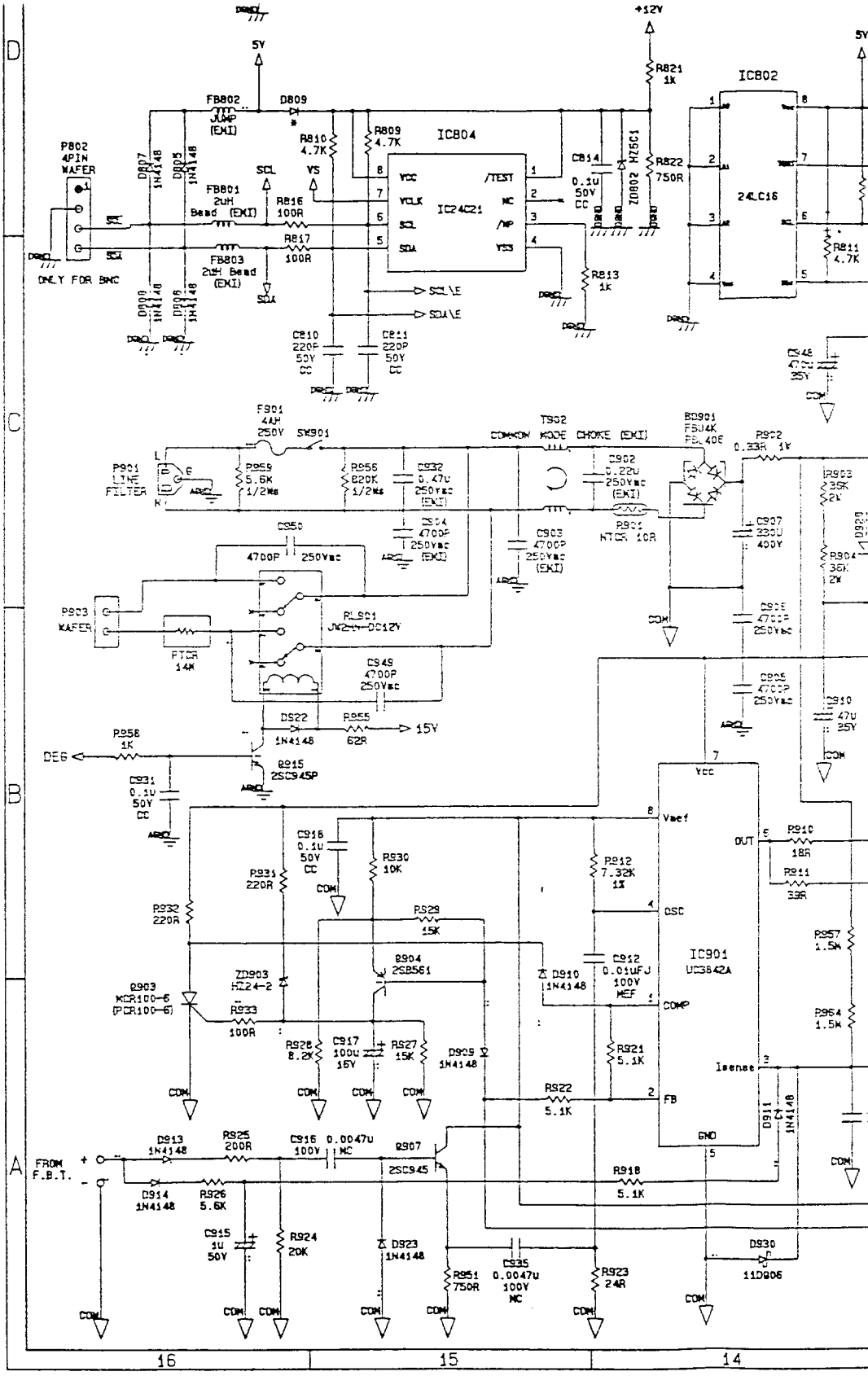

DRIVER
CHOKE
7050957H10
Q303 2SC5331
T601
7177H10000
D304 BY459F
RL301
JW2H-DC12V
Q306 2SC945
Q307 IRF640
Q330 IRF640
Q320 RN1203
Q331 RN1203
Q332 RN1203
Q604 2SC945
Q605 2N3906
Q603 2N3904
Q503
Q501 RN1001
Q502 2SC945P
Q106 2SC2688
Q103 IRF740
Q102 2SA733
Q101 C2120
D114 RGP02-12
D310 RGP02-18
D305 RGP02-18
D308 RGP10D
D309 RGP10D
D317 RGP10J
D123 RGP10J
D101 1N4148
D105 1N4606
D107 1N4148
D111 1N4148
D311 1N4148
D604 1N4148
D603 1N4148
D605 1N4148
D120 1N4148
D127
D128
D113
D112
FB101 Bead 2uH (EMI)
FB102 Bead 2uH (EMI)
FB103 Bead 2uH (EMI)
FB501 2uH Bead (EMI)
FB502 2uH Bead (EMI)
FB503 2uH Bead (EMI)
L103 150uH PEAKING
L102 JUMP
L303 0.8mH
L304 20.5T (FOR KITACHI CRT) 19.5T (FOR TOSHIBA CRT)
L305 90uH T/60uH
L306 8mH
SW301
S6101 SPARK-GA 1.2KV
IC501 TDA7057AQ
IC503 LM317
T104 7050619000
R101 3K
R102 6.8K
R103 3.3K
R104 10K
R105 JUMP
R106 680K
R107 4.7K
R108 200K 1/2W
R109 27K
R110 24R
R111 430K
R112 430K
R113 2.7K
R114 560R
R115 10R
R116 4.7K
R117 1K
R118 680R
R119 7.5R 1W
R120 JUMP
R121 1K
R122 10K
R123 1K
R124 10K
R125 1.1K
R126 680R
R127 10K
R128 2.1K
R129 7.5R 1W
R130 4.7K
R131 1K
R132 10K
R133 1K
R134
R135 JUMP
R136
R147
R148
R149
R150
R151
R152
R153
R154
R155
R156
R157 1K
R158
R159
R160
R161
R162
R163
R164
R165
R166
R167
R168
R169
R170
R171
R172
R173
R174
R175
R176
R177
R178
R179
R180
R181
R182
R183
R184
R185
R186
R187
R188
R189
R190
R191
R192
R193
R194
R195
R196
R197
R198
R199
R200
R201
R202
R203
R204
R205
R206
R207
R208
R209
R210
R211
R212
R213
R214
R215
R216
R217
R218
R219
R220
R221
R222
R223
R224
R225
R226
R227
R228
R229
R230
R231
R232
R233
R234
R235
R236
R237
R238
R239
R240
R241
R242
R243
R244
R245
R246
R247
R248
R249
R250
R251
R252
R253
R254
R255
R256
R257
R258
R259
R260
R261
R262
R263
R264
R265
R266
R267
R268
R269
R270
R271
R272
R273
R274
R275
R276
R277
R278
R279
R280
R281
R282
R283
R284
R285
R286
R287
R288
R289
R290
R291
R292
R293
R294
R295
R296
R297
R298
R299
R300
R301
R302
R303
R304
R305
R306
R307
R308
R309
R310
R311
R312
R313
R314
R315
R316
R317
R318
R319
R320
R321
R322
R323
R324
R325
R326
R327
R328
R329
R330
R331
R332
R333
R334
R335
R336
R337
R338
R339
R340
R341
R342
R343
R344
R345
R346
R347
R348
R349
R350
R351
R352
R353
R354
R355
R356
R357
R358
R359
R360
R361
R362
R363
R364
R365
R366
R367
R368
R369
R370
R371
R372
R373
R374
R375
R376
R377
R378
R379
R380
R381
R382
R383
R384
R385
R386
R387
R388
R389
R390
R391
R392
R393
R394
R395
R396
R397
R398
R399
R400
R401
R402
R403
R404
R405
R406
R407
R408
R409
R410
R411
R412
R413
R414
R415
R416
R417
R418
R419
R420
R421
R422
R423
R424
R425
R426
R427
R428
R429
R430
R431
R432
R433
R434
R435
R436
R437
R438
R439
R440
R441
R442
R443
R444
R445
R446
R447
R448
R449
R450
R451
R452
R453
R454
R455
R456
R457
R458
R459
R460
R461
R462
R463
R464
R465
R466
R467
R468
R469
R470
R471
R472
R473
R474
R475
R476
R477
R478
R479
R480
R481
R482
R483
R484
R485
R486
R487
R488
R489
R490
R491
R492
R493
R494
R495
R496
R497
R498
R499
R500
R501
R502
R503
R504
R505
R506
R507
R508
R509
R510
R511
R512
R513
R514
R515
R516
R517
R518
R519
R520
R521
R522
R523
R524
R525
R526
R527
R528
R529
R530
R531
R532
R533
R534
R535
R536
R537
R538
R539
R540
R541
R542
R543
R544
R545
R546
R547
R548
R549
R550
R551
R552
R553
R554
R555
R556
R557
R558
R559
R560
R561
R562
R563
R564
R565
R566
R567
R568
R569
R570
R571
R572
R573
R574
R575
R576
R577
R578
R579
R580
R581
R582
R583
R584
R585
R586
R587
R588
R589
R590
R591
R592
R593
R594
R595
R596
R597
R598
R599
R600
R601
R602
R603
R604
R605
R606
R607
R608
R609
R610
R611
R612
R613
R614
R615
R616
R617
R618
R619
R620
R621
R622
R623
R624
R625
R626
R627
R628
R629
R630
R631
R632
R633
R634
R635
R636
R637
R638
R639
R640
R641
R642
R643
R644
R645
R646
R647
R648
R649
R650
R651
R652
R653
R654
R655
R656
R657
R658
R659
R660
R661
R662
R663
R664
R665
R666
R667
R668
R669
R670
R671
R672
R673
R674
R675
R676
R677
R678
R679
R680
R681
R682
R683
R684
R685
R686
R687
R688
R689
R690
R691
R692
R693
R694
R695
R696
R697
R698
R699
R700
R701
R702
R703
R704
R705
R706
R707
R708
R709
R710
R711
R712
R713
R714
R715
R716
R717
R718
R719
R720
R721
R722
R723
R724
R725
R726
R727
R728
R729
R730
R731
R732
R733
R734
R735
R736
R737
R738
R739
R740
R741
R742
R743
R744
R745
R746
R747
R748
R749
R750
R751
R752
R753
R754
R755
R756
R757
R758
R759
R760
R761
R762
R763
R764
R765
R766
R767
R768
R769
R770
R771
R772
R773
R774
R775
R776
R777
R778
R779
R780
R781
R782
R783
R784
R785
R786
R787
R788
R789
R790
R791
R792
R793
R794
R795
R796
R797
R798
R799
R800
R801
R802
R803
R804
R805
R806
R807
R808
R809
R810
R811
R812
R813
R814
R815
R816
R817
R818
R819
R820
R821
R822
R823
R824
R825
R826
R827
R828
R829
R830
R831
R832
R833
R834
R835
R836
R837
R838
R839
R840
R841
R842
R843
R844
R845
R846
R847
R848
R849
R850
R851
R852
R853
R854
R855
R856
R857
R858
R859
R860
R861
R862
R863
R864
R865
R866
R867
R868
R869
R870
R871
R872
R873
R874
R875
R876
R877
R878
R879
R880
R881
R882
R883
R884
R885
R886
R887
R888
R889
R890
R891
R892
R893
R894
R895
R896
R897
R898
R899
R900
R901
R902
R903
R904
R905
R906
R907
R908
R909
R910
R911
R912
R913
R914
R915
R916
R917
R918
R919
R920
R921
R922
R923
R924
R925
R926
R927
R928
R929
R930
R931
R932
R933
R934
R935
R936
R937
R938
R939
R940
R941
R942
R943
R944
R945
R946
R947
R948
R949
R950
R951
R952
R953
R954
R955
R956
R957
R958
R959
R960
R961
R962
R963
R964
R965
R966
R967
R968
R969
R970
R971
R972
R973
R974
R975
R976
R977
R978
R979
R980
R981
R982
R983
R984
R985
R986
R987
R988
R989
R990
R991
R992
R993
R994
R995
R996
R997
R998
R999
R1000
C101 .022u 100V MF
C102 .022u 100V MF
C103 0.1u 50V
C104 100u 25V
C105 0.1u 50V
C106 0.1u 50V
C107 0.1u 50V
C108 100u 25V
C109 0.1u 50V
C110 0.1u 50V
C111 0.1u 50V
C112 0.1u 50V
C113 0.1u 50V
C114 0.1u 50V
C115 22u 250V
C116 0.1u 50V
C117 0.1u 50V
C118 0.1u 50V
C119 .22u 100V MC
C120 .0056u 630V PP
C121 2.7K
C122 2.2u 50V NP
C123 0.1u 50V
C124 0.1u 50V
C125 0.012u 400V MF T/.0091u/630V/PP
C126 0.1u 50V
C127 0.1u 50V
C128 10u 250V 105
C129 0.1u 50V
C130 0.1u MC
C131 0.1u 50V
C132 0.1u 50V
C133 0.1u 50V
C134 1000P CC 1KV (EMI)
C135 0.1u 50V
C136 0.1u 50V
C137 0.1u 50V
C138 0.1u 50V
C139 0.1u 50V
C140 0.1u 50V
C141 0.1u 50V
C142 0.1u 50V
C143 0.1u 50V
C144 0.1u 50V
C145 0.1u 50V
C146 0.1u 50V
C147 0.1u 50V
C148 0.1u 50V
C149 0.1u 50V
C150 0.1u 50V
C151 0.1u 50V
C152 0.1u 50V CC
C153 0.1u 50V
C154 0.1u 50V
C155 0.1u 50V
C156 0.1u 50V
C157 0.1u 50V
C158 0.1u 50V
C159 0.1u 50V
C160 0.1u 50V
C161 0.1u 50V
C162 0.1u 50V
C163 0.1u 50V
C164 0.1u 50V
C165 0.1u 50V
C166 0.1u 50V
C167 0.1u 50V
C168 0.1u 50V
C169 0.1u 50V
C170 0.1u 50V
C171 0.1u 50V
C172 0.1u 50V
C173 0.1u 50V
C174 0.1u 50V
C175 0.1u 50V
C176 0.1u 50V
C177 0.1u 50V
C178 0.1u 50V
C179 0.1u 50V
C180 0.1u 50V
C181 0.1u 50V
C182 0.1u 50V
C183 0.1u 50V
C184 0.1u 50V
C185 0.1u 50V
C186 0.1u 50V
C187 0.1u 50V
C188 0.1u 50V
C189 0.1u 50V
C190 0.1u 50V
C191 0.1u 50V
C192 0.1u 50V
C193 0.1u 50V
C194 0.1u 50V
C195 0.1u 50V
C196 0.1u 50V
C197 0.1u 50V
C198 0.1u 50V
C199 0.1u 50V
C200 0.1u 50V
C201 0.1u 50V
C202 0.1u 50V
C203 0.1u 50V
C204 0.1u 50V
C205 0.1u 50V
C206 0.1u 50V
C207 0.1u 50V
C208 0.1u 50V
C209 0.1u 50V
C210 0.1u 50V
C211 0.1u 50V
C212 0.1u 50V
C213 0.1u 50V
C214 0.1u 50V
C215 0.1u 50V
C216 0.1u 50V
C217 0.1u 50V
C218 0.1u 50V
C219 0.1u 50V
C220 0.1u 50V
C221 0.1u 50V
C222 0.1u 50V
C223 0.1u 50V
C224 0.1u 50V
C225 0.1u 50V
C226 0.1u 50V
C227 0.1u 50V
C228 0.1u 50V
C229 0.1u 50V
C230 0.1u 50V
C231 0.1u 50V
C232 0.1u 50V
C233 0.1u 50V
C234 0.1u 50V
C235 0.1u 50V
C236 0.1u 50V
C237 0.1u 50V
C238 0.1u 50V
C239 0.1u 50V
C240 0.1u 50V
C241 0.1u 50V
C242 0.1u 50V
C243 0.1u 50V
C244 0.1u 50V
C245 0.1u 50V
C246 0.1u 50V
C247 0.1u 50V
C248 0.1u 50V
C249 0.1u 50V
C250 0.1u 50V
C251 0.1u 50V
C252 0.1u 50V
C253 0.1u 50V
C254 0.1u 50V
C255 0.1u 50V
C256 0.1u 50V
C257 0.1u 50V
C258 0.1u 50V
C259 0.1u 50V
C260 0.1u 50V
C261 0.1u 50V
C262 0.1u 50V
C263 0.1u 50V
C264 0.1u 50V
C265 0.1u 50V
C266 0.1u 50V
C267 0.1u 50V
C268 0.1u 50V
C269 0.1u 50V
C270 0.1u 50V
C271 0.1u 50V
C272 0.1u 50V
C273 0.1u 50V
C274 0.1u 50V
C275 0.1u 50V
C276 0.1u 50V
C277 0.1u 50V
C278 0.1u 50V
C279 0.1u 50V
C280 0.1u 50V
C281 0.1u 50V
C282 0.1u 50V
C283 0.1u 50V
C284 0.1u 50V
C285 0.1u 50V
C286 0.1u 50V
C287 0.1u 50V
C288 0.1u 50V
C289 0.1u 50V
C290 0.1u 50V
C291 0.1u 50V
C292 0.1u 50V
C293 0.1u 50V
C294 0.1u 50V
C295 0.1u 50V
C296 0.1u 50V
C297 0.1u 50V
C298 0.1u 50V
C299 0.1u 50V
C300 0.1u 50V
C301 0.1u 50V
C302 0.1u 50V
C303 0.1u 50V
C304 0.1u 50V
C305 0.1u 50V
C306 0.1u 50V
C307 0.1u 50V
C308 0.1u 50V
C309 0.1u 50V
C310 0.1u 50V
C311 0.1u 50V
C312 0.1u 50V
C313 0.1u 50V
C314 0.1u 50V
C315 0.1u 50V
C316 0.1u 50V
C317 0.1u 50V
C318 0.1u 50V
C319 0.1u 50V
C320 0.1u 50V
C321 0.1u 50V
C322 0.1u 50V
C323 0.1u 50V
C324 0.1u 50V
C325 0.1u 50V
C326 0.1u 50V
C327 0.1u 50V
C328 0.1u 50V
C329 0.1u 50V
C330 0.1u 50V
C331 0.1u 50V
C332 0.1u 50V
C333 0.1u 50V
C334 0.1u 50V
C335 0.1u 50V
C336 0.1u 50V
C337 0.1u 50V
C338 0.1u 50V
C339 0.1u 50V
C340 0.1u 50V
C341 0.1u 50V
C342 0.1u 50V
C343 0.1u 50V
C344 0.1u 50V
C345 0.1u 50V
C346 0.1u 50V
C347 0.1u 50V
C348 0.1u 50V
C349 0.1u 50V
C350 0.1u 50V
C351 0.1u 50V
C352 0.1u 50V
C353 0.1u 50V
C354 0.1u 50V
C355 0.1u 50V
C356 0.1u 50V
C357 0.1u 50V
C358 0.1u 50V
C359 0.1u 50V
C360 0.1u 50V
C361 0.1u 50V
C362 0.1u 50V
C363 0.1u 50V
C364 0.1u 50V
C365 0.1u 50V
C366 0.1u 50V
C367 0.1u 50V
C368 0.1u 50V
C369 0.1u 50V
C370 0.1u 50V
C371 0.1u 50V
C372 0.1u 50V
C373 0.1u 50V
C374 0.1u 50V
C375 0.1u 50V
C376 0.1u 50V
C377 0.1u 50V
C378 0.1u 50V
C379 0.1u 50V
C380 0.1u 50V
C381 0.1u 50V
C382 0.1u 50V
C383 0.1u 50V
C384 0.1u 50V
C385 0.1u 50V
C386 0.1u 50V
C387 0.1u 50V
C388 0.1u 50V
C389 0.1u 50V
C390 0.1u 50V
C391 0.1u 50V
C392 0.1u 50V
C393 0.1u 50V
C394 0.1u 50V
C395 0.1u 50V
C396 0.1u 50V
C397 0.1u 50V
C398 0.1u 50V
C399 0.1u 50V
C400 0.1u 50V
C401 0.1u 50V
C402 0.1u 50V
C403 0.1u 50V
C404 0.1u 50V
C405 0.1u 50V
C406 0.1u 50V
C407 0.1u 50V
C408 0.1u 50V
C409 0.1u 50V
C410 0.1u 50V
C411 0.1u 50V
C412 0.1u 50V
C413 0.1u 50V
C414 0.1u 50V
C415 0.1u 50V
C416 0.1u 50V
C417 0.1u 50V
C418 0.1u 50V
C419 0.1u 50V
C420 0.1u 50V
C421 0.1u 50V
C422 0.1u 50V
C423 0.1u 50V
C424 0.1u 50V
C425 0.1u 50V
C426 0.1u 50V
C427 0.1u 50V
C428 0.1u 50V
C429 0.1u 50V
C430 0.1u 50V
C431 0.1u 50V
C432 0.1u 50V
C433 0.1u 50V
C434 0.1u 50V
C435 0.1u 50V
C436 0.1u 50V
C437 0.1u 50V
C438 0.1u 50V
C439 0.1u 50V
C440 0.1u 50V
C441 0.1u 50V
C442 0.1u 50V
C443 0.1u 50V
C444 0.1u 50V
C445 0.1u 50V
C446 0.1u 50V
C447 0.1u 50V
C448 0.1u 50V
C449 0.1u 50V
C450 0.1u 50V
C451 0.1u 50V
C452 0.1u 50V
C453 0.1u 50V
C454 0.1u 50V
C455 0.1u 50V
C456 0.1u 50V
C457 0.1u 50V
C458 0.1u 50V
C459 0.1u 50V
C460 0.1u 50V
C461 0.1u 50V
C462 0.1u 50V
C463 0.1u 50V
C464 0.1u 50V
C465 0.1u 50V
C466 0.1u 50V
C467 0.1u 50V
C468 0.1u 50V
C469 0.1u 50V
C470 0.1u 50V
C471 0.1u 50V
C472 0.1u 50V
C473 0.1u 50V
C474 0.1u 50V
C475 0.1u 50V
C476 0.1u 50V
C477 0.1u 50V
C478 0.1u 50V
C479 0.1u 50V
C480 0.1u 50V
C481 0.1u 50V
C482 0.1u 50V
C483 0.1u 50V
C484 0.1u 50V
C485 0.1u 50V
C486 0.1u 50V
C487 0.1u 50V
C488 0.1u 50V
C489 0.1u 50V
C490 0.1u 50V
C491 0.1u 50V
C492 0.1u 50V
C493 0.1u 50V
C494 0.1u 50V
C495 0.1u 50V
C496 0.1u 50V
C497 0.1u 50V
C498 0.1u 50V
C499 0.1u 50V
C500 0.1u 50V
C501 0.1u 50V
C502 0.22u 100V MC
C503 0.22u 100V MC
C504 10u 16V
C505
C506 220u 16V
C507 220u 16V
C508 100u 25V
C509 0.1u 50V
C510 0.1u 50V
C511 0.1u 50V
C512 0.1u 100V MC
C513 0.1u 50V
C514 .033u 100V MC
C515 0.1u 50V
C516 0.1u 50V
C517 0.1u 50V
C518 0.1u 50V
C519 0.1u 50V
C520 0.72uF 250V MPP T/0.75u
C521 220u 16V
C522 0.1u 50V
C523 0.1u 50V
C524 0.1u 50V
C525 0.1u 50V
C526 0.1u 50V
C527 1000u 25V
C528 0.1u 50V
C529 0.1u 50V
C530 0.1u 50V
C531 0.1u 50V
C532 0.1u 50V
C533 0.1u 50V
C534 0.1u 50V
C535 0.1u 50V
C536 0.1u 50V
C537 0.1u 50V
C538 0.1u 50V
C539 0.1u 50V
C540 0.1u 50V
C541 0.1u 50V
C542 0.1u 50V
C543 0.1u 50V
C544 0.1u 50V
C545 0.1u 50V
C546 0.1u 50V
C547 0.1u 50V
C548 0.1u 50V
C549 0.1u 50V
C550 0.1u 50V
C551 0.1u 50V
C552 0.1u 50V
C553 0.1u 50V
C554 0.1u 50V
C555 0.1u 50V
C556 0.1u 50V
C557 0.1u 50V
C558 0.1u 50V
C559 0.1u 50V
C560 0.1u 50V
C561 0.1u 50V
C562 0.1u 50V
C563 0.1u 50V
C564 0.1u 50V
C565 0.1u 50V
C566 0.1u 50V
C567 0.1u 50V
C568 0.1u 50V
C569 0.1u 50V
C570 0.1u 50V
C571 0.1u 50V
C572 0.1u 50V
C573 0.1u 50V
C574 0.1u 50V
C575 0.1u 50V
C576 0.1u 50V
C577 0.1u 50V
C578 0.1u 50V
C579 0.1u 50V
C580 0.1u 50V
C581 0.1u 50V
C582 0.1u 50V
C583 0.1u 50V
C584 0.1u 50V
C585 0.1u 50V
C586 0.1u 50V
C587 0.1u 50V
C588 0.1u 50V
C589 0.1u 50V
C590 0.1u 50V
C591 0.1u 50V
C592 0.1u 50V
C593 0.1u 50V
C594 0.1u 50V
C595 0.1u 50V
C596 0.1u 50V
C597 0.1u 50V
C598 0.1u 50V
C599 0.1u 50V
C600 0.1u 50V
C601 0.1u 50V
C602 0.1u 50V
C603 0.1u 50V
C604 0.1u 50V
C605 0.1u 50V
C606 0.1u 50V
C607 0.1u 50V
C608 0.1u 50V
C609 0.1u 50V
C610 0.1u 50V
C611 0.1u 50V
C612 0.1u 50V
C613 0.1u 50V
C614 0.1u 50V
C615 0.1u 50V
C616 0.1u 50V
C617 0.1u 50V
C618 0.1u 50V
C619 0.1u 50V
C620 0.1u 50V
C621 0.1u 50V
C622 0.1u 50V
C623 0.1u 50V
C624 0.1u 50V
C625 0.1u 50V
C626 0.1u 50V
C627 0.1u 50V
C628 0.1u 50V
C629 0.1u 50V
C630 0.1u 50V
C631 0.1u 50V
C632 0.1u 50V
C633 0.1u 50V
C634 0.1u 50V
C635 0.1u 50V
C636 0.1u 50V
C637 0.1u 50V
C638 0.1u 50V
C639 0.1u 50V
C640 0.1u 50V
C641 0.1u 50V
C642 0.1u 50V
C643 0.1u 50V
C644 0.1u 50V
C645 0.1u 50V
C646 0.1u 50V
C647 0.1u 50V
C648 0.1u 50V
C649 0.1u 50V
C650 0.1u 50V
C651 0.1u 50V
C652 0.1u 50V
C653 0.1u 50V
C654 0.1u 50V
C655 0.1u 50V
C656 0.1u 50V
C657 0.1u 50V
C658 0.1u 50V
C659 0.1u 50V
C660 0.1u 50V
C661 0.1u 50V
C662 0.1u 50V
C663 0.1u 50V
C664 0.1u 50V
C665 0.1u 50V
C666 0.1u 50V
C667 0.1u 50V
C668 0.1u 50V
C669 0.1u 50V
C670 0.1u 50V
C671 0.1u 50V
C672 0.1u 50V
C673 0.1u 50V
C674 0.1u 50V
C675 0.1u 50V
C676 0.1u 50V
C677 0.1u 50V
C678 0.1u 50V
C679 0.1u 50V
C680 0.1u 50V
C681 0.1u 50V
C682 0.1u 50V
C683 0.1u 50V
C684 0.1u 50V
C685 0.1u 50V
C686 0.1u 50V
C687 0.1u 50V
C688 0.1u 50V
C689 0.1u 50V
C690 0.1u 50V
C691 0.1u 50V
C692 0.1u 50V
C693 0.1u 50V
C694 0.1u 50V
C695 0.1u 50V
C696 0.1u 50V
C697 0.1u 50V
C698 0.1u 50V
C699 0.1u 50V
C700 0.1u 50V
C701 0.1u 50V
C702 0.1u 50V
C703 0.1u 50V
C704 0.1u 50V
C705 0.1u 50V
C706 0.1u 50V
C707 0.1u 50V
C708 0.1u 50V
C709 0.1u 50V
C710 0.1u 50V
C711 0.1u 50V
C712 0.1u 50V
C713 0.1u 50V
C714 0.1u 50V
C715 0.1u 50V
C716 0.1u 50V
C717 0.1u 50V
C718 0.1u 50V
C719 0.1u 50V
C720 0.1u 50V
C721 0.1u 50V
C722 0.1u 50V
C723 0.1u 50V
C724 0.1u 50V
C725 0.1u 50V
C726 0.1u 50V
C727 0.1u 50V
C728 0.1u 50V
C729 0.1u 50V
C730 0.1u 50V
C731 0.1u 50V
C732 0.1u 50V
C733 0.1u 50V
C734 0.1u 50V
C735 0.1u 50V
C736 0.1u 50V
C737 0.1u 50V
C738 0.1u 50V
C739 0.1u 50V
C740 0.1u 50V
C741 0.1u 50V
C742 0.1u 50V
C743 0.1u 50V
C744 0.1u 50V
C745 0.1u 50V
C746 0.1u 50V
C747 0.1u 50V
C748 0.1u 50V
C749 0.1u 50V
C750 0.1u 50V
C751 0.1u 50V
C752 0.1u 50V
C753 0.1u 50V
C754 0.1u 50V
C755 0.1u 50V
C756 0.1u 50V
C757 0.1u 50V
C758 0.1u 50V
C759 0.1u 50V
C760 0.1u 50V
C761 0.1u 50V
C762 0.1u 50V
C763 0.1u 50V
C764 0.1u 50V
C765 0.1u 50V
C766 0.1u 50V
C767 0.1u 50V
C768 0.1u 50V
C769 0.1u 50V
C770 0.1u 50V
C771 0.1u 50V
C772 0.1u 50V
C773 0.1u 50V
C774 0.1u 50V
C775 0.1u 50V
C776 0.1u 50V
C777 0.1u 50V
C778 0.1u 50V
C779 0.1u 50V
C780 0.1u 50V
C781 0.1u 50V
C782 0.1u 50V
C783 0.1u 50V
C784 0.1u 50V
C785 0.1u 50V
C786 0.1u 50V
C787 0.1u 50V
C788 0.1u 50V
C789 0.1u 50V
C790 0.1u 50V
C791 0.1u 50V
C792 0.1u 50V
C793 0.1u 50V
C794 0.1u 50V
C795 0.1u 50V
C796 0.1u 50V
C797 0.1u 50V
C798 0.1u 50V
C799 0.1u 50V
C800 0.1u 50V
C801 0.1u 50V
C802 0.1u 50V
C803 0.1u 50V
C804 0.1u 50V
C805 0.1u 50V
C806 0.1u 50V
C807 0.1u 50V
C808 0.1u 50V
C809 0.1u 50V
C810 0.1u 50V
C811 0.1u 50V
C812 0.1u 50V
C813 0.1u 50V
C814 0.1u 50V
C815 0.1u 50V
C816 0.1u 50V
C817 0.1u 50V
C818 0.1u 50V
C819 0.1u 50V
C820 0.1u 50V
C821 0.1u 50V
C822 0.1u 50V
C823 0.1u 50V
C824 0.1u 50V
C825 0.1u 50V
C826 0.1u 50V
C827 0.1u 50V
C828 0.1u 50V
C829 0.1u 50V
C830 0.1u 50V
C831 0.1u 50V
C832 0.1u 50V
C833 0.1u 50V
C834 0.1u 50V
C835 0.1u 50V
C836 0.1u 50V
C837 0.1u 50V
C838 0.1u 50V
C839 0.1u 50V
C840 0.1u 50V
C841 0.1u 50V
C842 0.1u 50V
C843 0.1u 50V
C844 0.1u 50V
C845 0.1u 50V
C846 0.1u 50V
C847 0.1u 50V
C848 0.1u 50V
C849 0.1u 50V
C850 0.1u 50V
C851 0.1u 50V
C852 0.1u 50V
C853 0.1u 50V
C854 0.1u 50V
C855 0.1u 50V
C856 0.1u 50V
C857 0.1u 50V
C858 0.1u 50V
C859 0.1u 50V
C860 0.1u 50V
C861 0.1u 50V
C862 0.1u 50V
C863 0.1u 50V
C864 0.1u 50V
C865 0.1u 50V
C866 0.1u 50V
C867 0.1u 50V
C868 0.1u 50V
C869 0.1u 50V
C870 0.1u 50V
C871 0.1u 50V
C872 0.1u 50V
C873 0.1u 50V
C874 0.1u 50V
C875 0.1u 50V
C876 0.1u 50V
C877 0.1u 50V
C878 0.1u 50V
C879 0.1u 50V
C880 0.1u 50V
C881 0.1u 50V
C882 0.1u 50V
C883 0.1u 50V
C884 0.1u 50V
C885 0.1u 50V
C886 0.1u 50V
C887 0.1u 50V
C888 0.1u 50V
C889 0.1u 50V
C890 0.1u 50V
C891 0.1u 50V
C892 0.1u 50V
C893 0.1u 50V
C894 0.1u 50V
C895 0.1u 50V
C896 0.1u 50V
C897 0.1u 50V
C898 0.1u 50V
C899 0.1u 50V
C900 0.1u 50V
C901 0.1u 50V
C902 0.1u 50V
C903 0.1u 50V
C904 0.1u 50V
C905 0.1u 50V
C906 0.1u 50V
C907 0.1u 50V
C908 0.1u 50V
C909 0.1u 50V
C910 0.1u 50V
C911 0.1u 50V
C912 0.1u 50V
C913 0.1u 50V
C914 0.1u 50V
C915 0.1u 50V
C916 0.1u 50V
C917 0.1u 50V
C918 0.1u 50V
C919 0.1u 50V
C920 0.1u 50V
C921 0.1u 50V
C922 0.1u 50V
C923 0.1u 50V
C924 0.1u 50V
C925 0.1u 50V
C926 0.1u 50V
C927 0.1u 50V
C928 0.1u 50V
C929 0.1u 50V
C930 0.1u 50V
C931 0.1u 50V
C932 0.1u 50V
C933 0.1u 50V
C934 0.1u 50V
C935 0.1u 50V
C936 0.1u 50V
C937 0.1u 50V
C938 0.1u 50V
C939 0.1u 50V
C940 0.1u 50V
C941 0.1u 50V
C942 0.1u 50V
C943 0.1u 50V
C944 0.1u 50V
C945 0.1u 50V
C946 0.1u 50V
C947 0.1u 50V
C948 0.1u 50V
C949 0.1u 50V
C950 0.1u 50V
C951 0.1u 50V
C952 0.1u 50V
C953 0.1u 50V
C954 0.1u 50V
C955 0.1u 50V
C956 0.1u 50V
C957 0.1u 50V
C958 0.1u 50V
C959 0.1u 50V
C960 0.1u 50V
C961 0.1u 50V
C962 0.1u 50V
C963 0.1u 50V
C964 0.1u 50V
C965 0.1u 50V
C966 0.1u 50V
C967 0.1u 50V
C968 0.1u 50V
C969 0.1u 50V
C970 0.1u 50V
C971 0.1u 50V
C972 0.1u 50V
C973 0.1u 50V
C974 0.1u 50V
C975 0.1u 50V
C976 0.1u 50V
C977 0.1u 50V
C978 0.1u 50V
C979 0.1u 50V
C980 0.1u 50V
C981 0.1u 50V
C982 0.1u 50V
C983 0.1u 50V
C984 0.1u 50V
C985 0.1u 50V
C986 0.1u 50V
C987 0.1u 50V
C988 0.1u 50V
C989 0.1u 50V
C990 0.1u 50V
C991 0.1u 50V
C992 0.1u 50V
C993 0.1u 50V
C994 0.1u 50V
C995 0.1u 50V
C996 0.1u 50V
C997 0.1u 50V
C998 0.1u 50V
C999 0.1u 50V
C1000 0.1u 50V
AUDIO AMP.
AUDIO/15V
KUTING
+12V
200Vp-p
36Vp-p
200V B+
H-OY
1100
CS1
CS2
CS3
CS4
30K-34K
34K-39K
39K-45K
45K-55K
55K-69.5K
69.5K-85K
L
H
ZD602 HZ7C2
ZD338 HZ16-2
ZD370 HZ16-2
ZD502 MTZJ13A
ZD501 5.1E32
RP501 WAFER
RP502 RCA_JACK
IC503 LM317
P505 300K
R519 10K
R520 9.1K
R521 1.1K
R515 680R
Yp
Yc
Vp
Vc
SDA
SCL
PGND1
PGND2
OUT1+
OUT1-
OUT2+
OUT2-
Y1 (1)
Y1 (2)
VC1
VC2
n.c.

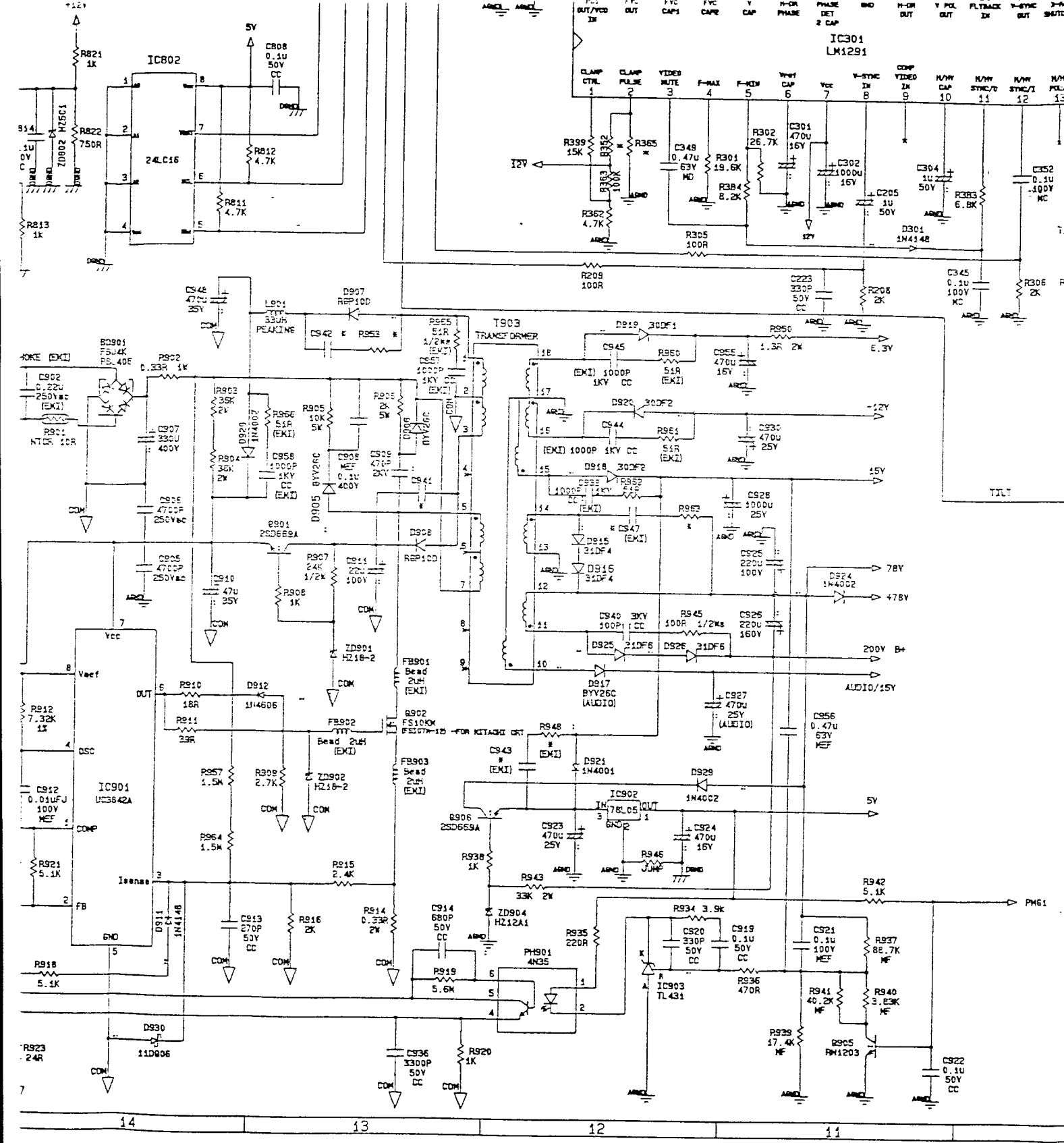


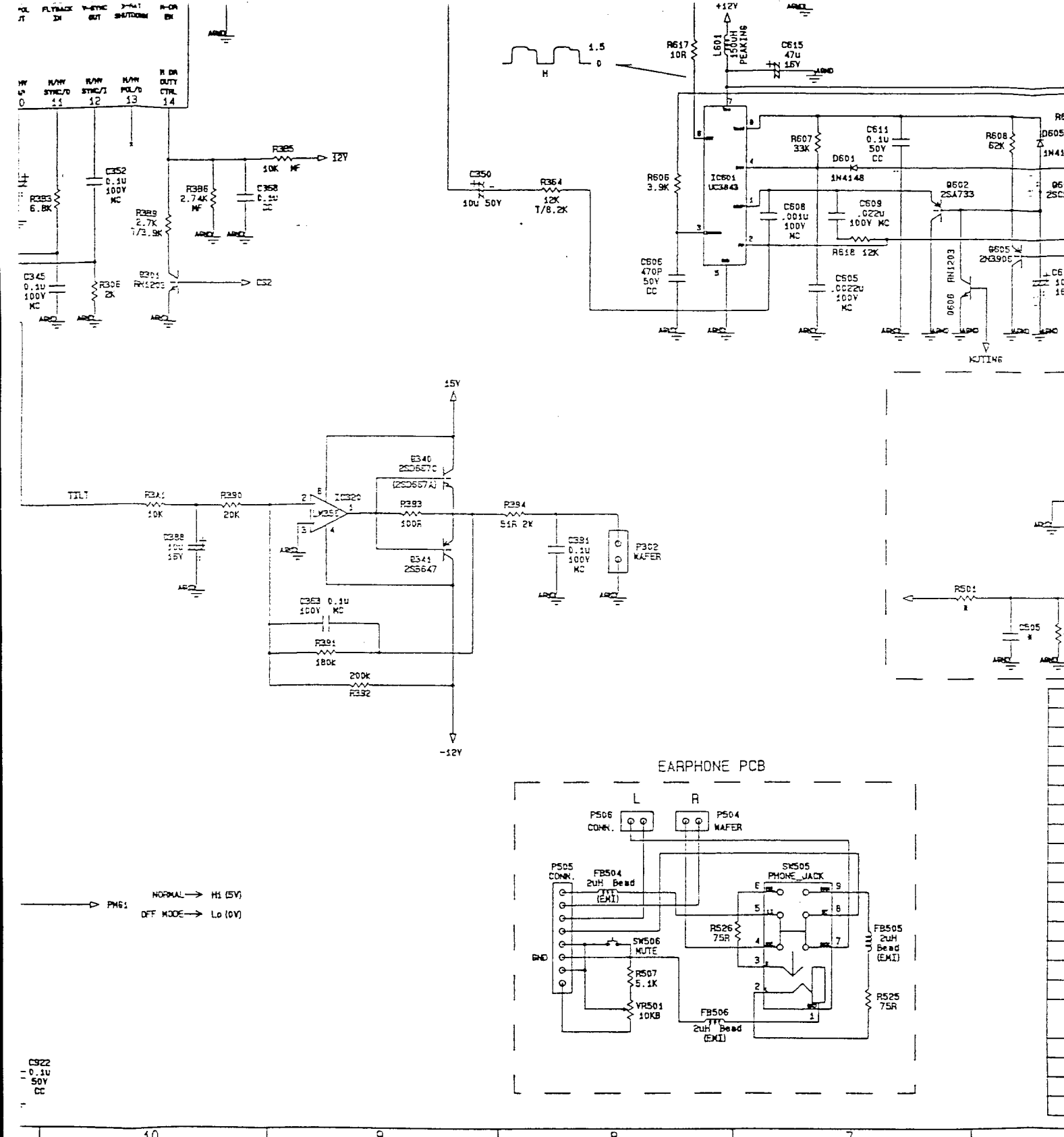
	30K-34K	34K-39K	39K-45K	45K-55K	55K-69.5K	69.5K-85K
CS1	L	L	L	H	H	H
CS2	L	L	L	L	H	H
CS3	L	L	H	L	L	H
CS4	L	H	H	H	H	H

MICROPHONE

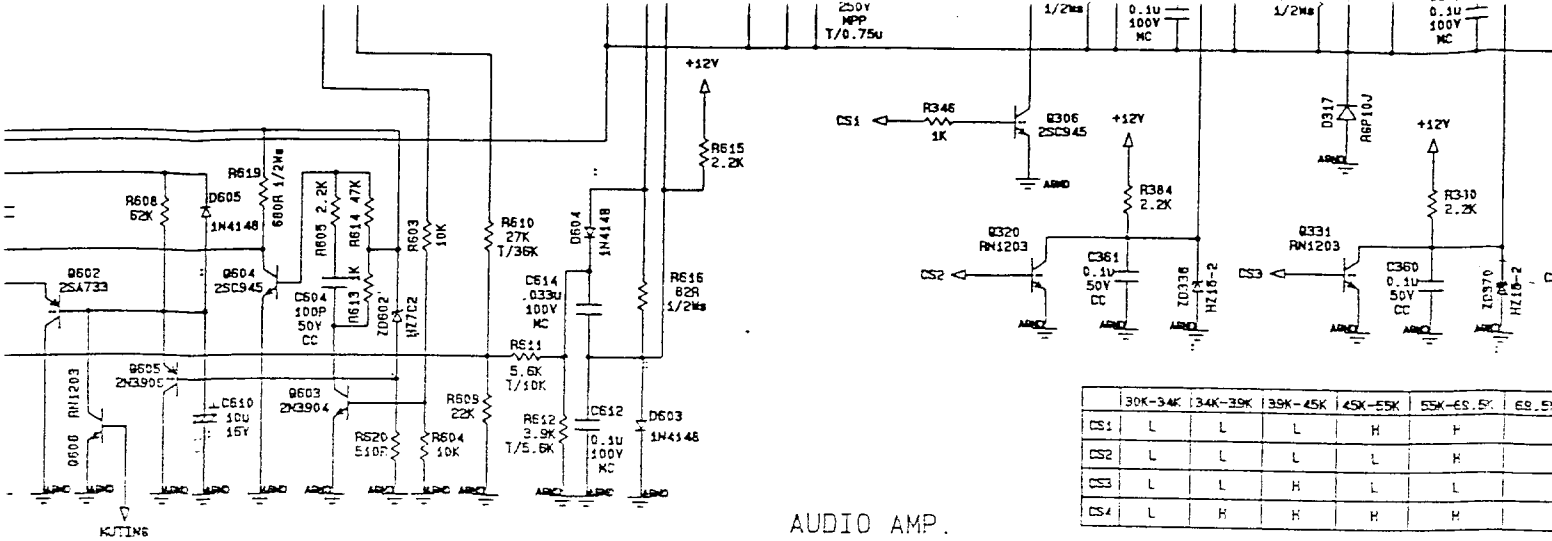



+12V
5V
R821 1k
ICB02
24LC16
FB802 JUMP (EXI)
D809
R810 4.7K
R809 4.7K
IC804
IC24C21
C814 0.1U 50V CC
R822 750R
ZD802 HZ5G1
P802 4PIN WAFER
D807 1N4148
D805 1N4148
FB801 2uH Bead (EXI)
SCL
SDA
R816 100R
R817 100R
FB803 2uH Bead (EXI)
D808 1N4148
D806 1N4148
ONLY FOR BNC
SCL\E
SDA\E
R813 1k
C810 220P 50V CC
C811 220P 50V CC
R811 4.7K
C948 470U 25V
F901 4AH 250V SW901
T902 COMMON MODE CHOKE (EXI)
BD901 FBU4K
R902 0.33R 1W
P901 LINE FILTER
R959 5.6K 1/2W
R956 820K 1/2W
C932 0.47U 250Vac (EXI)
C902 0.22U 250Vac (EXI)
R903 39K 2W
C907 330U 400V
R904 39K 2W
C950 4700P 250Vac
C904 4700P 250Vac (EXI)
C903 4700P 250Vac (EXI)
R901 NTC5 10R
C908 4700P 250Vac
P903 WAFER
RLY901 JW2SN-DC12V
PTC5 14R
C949 4700P 250Vac
C905 4700P 250Vac
C910 47U 35V
DS22 1N4148
R955 62R
15V
R958 1K
DEG
R915 2SC945P
C931 0.1U 50V CC
C916 0.1U 50V CC
R930 10K
R931 220R
R932 220R
R929 15K
R912 7.32K 1%
R910 18R
R911 39R
R957 1.5M
R964 1.5M
IC901 UC3842A
Q904 2SB561
ZD903 HZ24-2
Q903 MCR100-6 (PCR100-6)
R933 100R
C912 0.01uFJ 100V MEF
D910 1N4148
R928 8.2K
C917 100U 16V
R927 15K
D909 1N4148
R921 5.1K
R922 5.1K
D911 1N4148
FROM F.B.T.
D913 1N4148
R925 200R
C916 0.0047U 100V MC
Q907 2SC945
R918 5.1K
D914 1N4148
R926 5.6K
C915 1U 50V
R924 20K
D923 1N4148
C935 0.0047U 100V MC
R951 750R
R923 24R
D930 11D906
COM
D
C
B
A
16
15
14

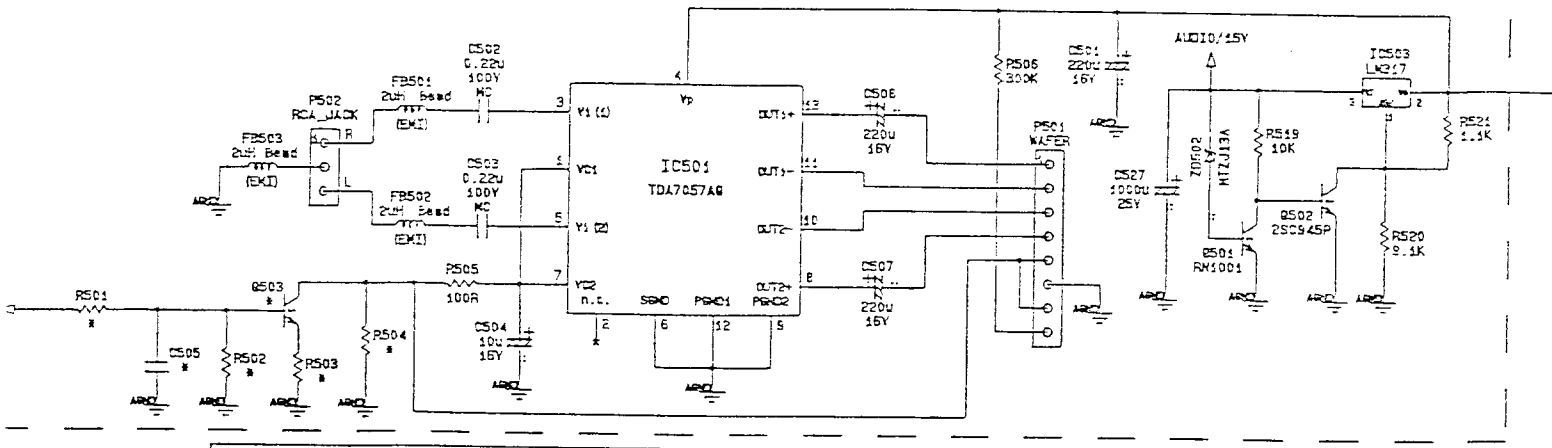

IC802
24LC16
IC301
LM1291
IC901
UC3842A
IC902
78L05
IC903
TL431
T903
TRANSFORMER
PH901
4N35
Q901
2SD669A
Q902
FS10KM
D901
BYV26C
D905
BYV26C
D917
BYV26C
(AUDIO)
D907
RBP10D
D908
RBP10D
D912
1N4606
D921
1N4001
D929
1N4002
D930
1SD906
D924
1N4002
D915
31DF4
D916
31DF4
D918
30DF2
D919
30DF1
D920
30DF2
D925
31DF6
D926
31DF6
D301
1N4148
ZD901
HZ18-2
ZD902
HZ18-2
ZD904
HZ12A1
FB901
Bead
2uH
(EXI)
FB902
Bead
2uH
(EXI)
FB903
Bead
2uH
(EXI)
5V
12V
-12V
15V
78Y
-78Y
200Y B+
AUDIO/15Y
PM61
TILT
COM
ARND
DGND
14
13
12
11


+12V
R617 10R
L601 150UH PEAKING
C615 47u 16V
1.5
0
H
R385 10K MF
12V
C352 0.1U 100V MC
R383 6.8K
R386 2.74K MF
C358 0.1u
R389 2.7K 1/3.9K
C345 0.1U 100V MC
R386 2K
R391 RN1203
CS2
C350 10u 50V
R364 12K 1/8.2K
R606 3.9K
IC601 UC3843
R607 33K
C611 0.1U 50V CC
D601 1N4148
R608 62K
D605 1N41
Q602 2SA733
C608 .001U 100V MC
C609 .022U 100V MC
R618 12K
C606 470P 50V CC
C605 .0022U 100V MC
Q605 2N3906
0600 RN1203
MUTING
15V
TILT
R331 10K
R330 20K
IC320 TL431
Q340 2SD667C
(2SD667A)
R393 100R
R394 51R 2K
C388 15V
Q341 2SS647
C391 0.1U 100V MC
P302 WAFER
C393 0.1U 100V MC
R391 180K
200K R392
-12V
R501
C505
EARPHONE PCB
L
R
P506 CONN.
P504 WAFER
P505 CONN.
FB504 2uH Bead (EMI)
SW505 PHONE_JACK
R526 75R
FB505 2uH Bead (EMI)
SW506 MUTE
GND
R507 5.1K
VR501 10KB
FB506 2uH Bead (EMI)
R525 75R
PM61
NORMAL → Hi (5V)
OFF MODE → Lo (0V)
C922 0.1U 50V CC

10	9	8	7



	30K-34K	34K-39K	39K-45K	45K-55K	55K-65.5K	65.5
CS1	L	L	L	H	H	
CS2	L	L	L	L	H	
CS3	L	L	H	L	L	
CS4	L	H	H	H	H	

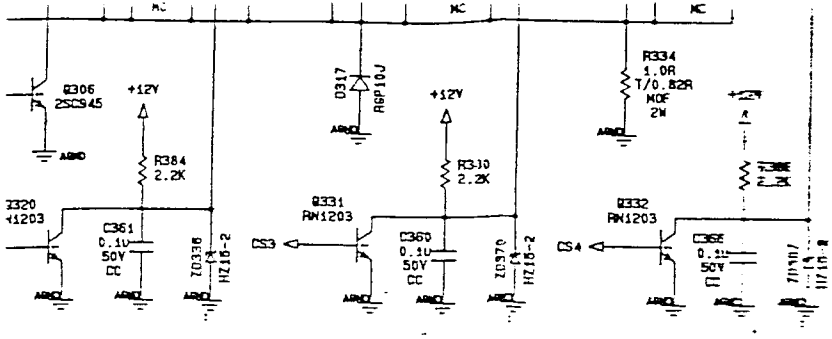


LOCATION	HITACHI CRT	TOSHIBA CRT
R610	27K	36K
R611	5.6K	10K
R612	3.9K	5.6K
R3A6	15K	8.2K
R364	12K	8.2K
R234	68K	160K
R3B9	2.7K	3.9K
R395	120R 1/2W	75R 1/2W
R334	1.0R 2W	0.82R/2W
C316	4300P/1.6KV PMHA	0.0047UF/1.6KV PMHA
C125	0.012u/400V MEF	0.0091u/630V PP
C367	0.56u/250V MPP	0.82u/250V MPP
C320	0.72u/250V MPP	0.75u/250V MPP
C319	0.27u/400V PMHA	0.3u/400V PMHA
C322	0.22u/400V MPP	0.27u/400V MPP
Q902	2SK1507/FS10KM-12 2SK1723	2SK1723
L304	20 1/2T	19 1/2T
C362	0.22u/400V MPP	0.24u/400V MPP
R3A8	130K	200K

LOCATION	MATSUSHITA FBT	SAMPO FBT
R324	5.6K	5.1K

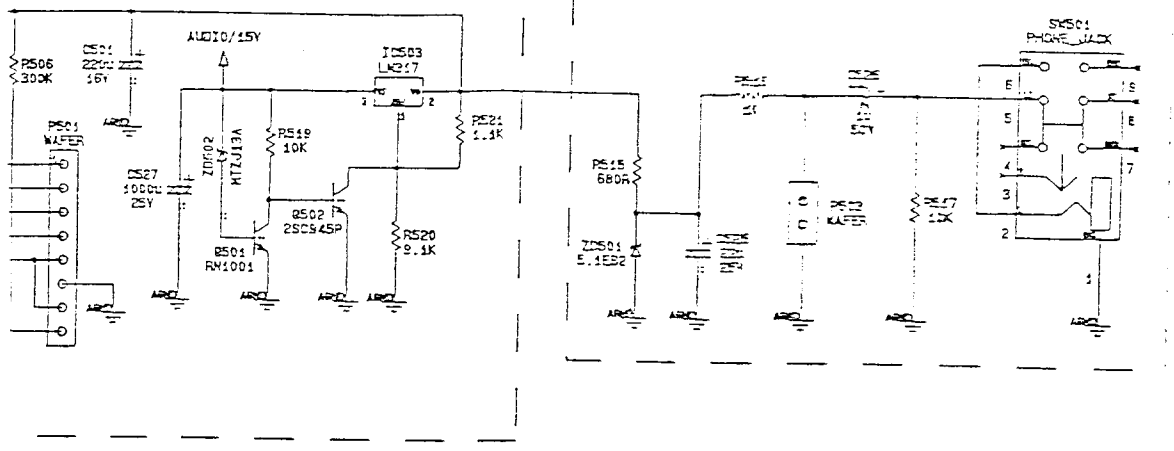
HITACHI CRT (LOW POWER) M41KSX180X11	R950
	3R 2W

Drawing Date
04-11-'96
Drawer
LO
Model No.



	30K-34K	34K-39K	39K-45K	45K-55K	55K-69.5K	69.5K-85K
CS1	L	L	L	H	H	H
CS2	L	L	L	L	H	H
CS3	L	L	H	L	L	H
CS4	L	H	H	H	H	H

MICROPHONE



LOCATION	MATSUSHITA FBT	SAMPO FBT
R324	5.6K	5.1K

HITACHI CRT (LOW POWER) M41KSX180X11	R950
	3R 2W

Taxan (Europe) Ltd.			
Drawing Date	Tolerance	Scale	Unit
04-11-'96	Dim: + - / Angle: - -		
Drawer	Sheet	Drawing Name	Filename
LO	1 of 1	DEF & SPS & LOGIC	EV74XX1A
Model No.	Ergovision 740 LR / TCO		

3 2 1

TAXAN

Document Control

Document Title:	Ergovision 740 LR & 740 TCO Service Manual		
Issue Number:	001		
Issued By:	Nigel Inkson	**Date of Issue:**	22/05/96

Revisions:

001 Original Issue 22/05/96

Safety Standards and Approvals

- This monitor complies with DHHS Rules 21 CFR Subchapter J Applicable at date of manufacture.
- Certified to comply with the limits for a Class B computing device pursuant to part 15 of FCC rules
- Please refer to instructions included FCC notice in the user's manual if this equipment is suspected of causing interference to radio reception.

Important Safety Notice

This equipment contains special components which are important for safety. These critical parts should only be replaced with the parts specified by the manufacturer in order to prevent X-radiation, shock, fire or other hazards. Do not modify the original design.

Preface
Before You Start

General Safety Precautions

1. Use an isolation transformer in the power line and AC supply to troubleshoot.
2. When servicing, observe the original lead dress, especially in the high voltage circuits. If a short circuit is found, replace all parts which have been overheated or damaged.
3. Before turing the display on, measure the resistance between B+ line and chassis ground. Connect the negative side of an ohmmeter to the B+ lines and the positive side to chassis ground. Each line should have more resisstance than the following specifications:

B+ Line	Minimum Resistance
+200V	134.5KΩ
+77V	60.51KΩ
+15.0V	30.54KΩ
-12.0V	12.63KΩ
+15V	27.13KΩ
+6.3V	4.150Ω
+5.0V	20.62KΩ

4. Potentials, as high as 26kV are present when this display is in operation. Operation of the display without the rear cover involves the danger of a shock hazard from the display power supply. Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high voltage equipment. Always discharge the anode of the picture tube to the display chassis before handling the tube.
5. After servicing, be sure to check the items listed in the Safety Checkout, below before returning the serviced unit to the customer.

Safety Checkout

The following checks must be made after correcting the original service problem and before the unit is returned to the customer.

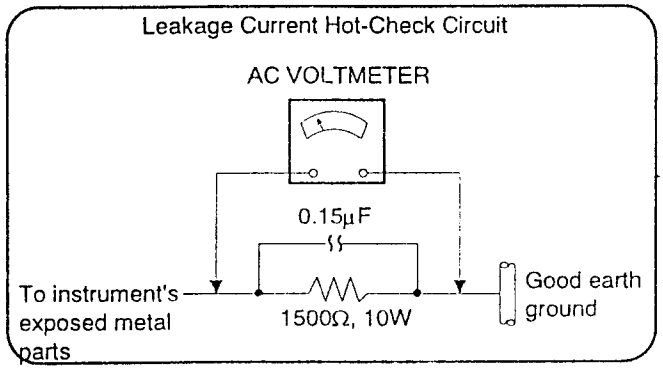
1. Check the area of your repair for unsoldered or poorly soldered connections. Check the entire board surface for solder splashes and bridges.
2. Check the inter board wiring to ensure that no wires are pinched or coated with high-wattage resistors.
3. Check that all control knobs, shields, covers, ground straps and mounting hardware have been replaced. Makde absolutely sure you have replaced all the insulators.
4. Look for any unauthorized replacement parts, particularly transistors, that may have been installed dueing a previous repair. Point them out to the customer land recommend their replacement.
5. Look for parts which, though functioning, show obvious signs of deterioration. Point them out to the customer and recommend their replacement.
6. Check the line cord for cracks and abrasion. Recommend the replacement of any such line cord to the customer.
7. After making any repair, check the B+ and HV to see whether they are at the values specified. Make sure your instruments are accurate; if your HV meter always shows a low HV, check the meter to ensure it is not malfunctioning.
8. Carry out the leakage current checks as detailed below overleaf.

Leakage Current Cold Check

1. Unplug the AC cord and connect a jumper between the two prongs on the plug.
2. Turn on the display power switch.
3. Use an ohmmeter to measure the resistance value between the jumpered AC plug and each exposed metallic cabint part on the display, such as screw heads, terminals control shafts, etc. When an exposed metallic part has a return path to the chassis, the reading should be between 240k and 5.2M. When exposed metal does not have a return path to the chassis, the reading must be.

Leakage Current Hot Check

1. Plug the AC cord into the AC outlet. Do not use an isolation transformer for this check.
2. Connect a 1.5k, 10 watt resistor in parallel with a 0.15F capacitor between each exposed metallic part on the set and a good earth ground (see How to Find a Good Earth, below) as shown in the diagram below.



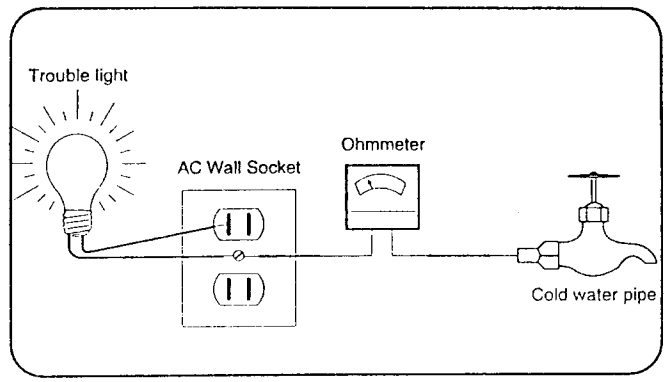
Example of Leakage Current Hot-Check Circuit

3. Use an AC voltmeter with 1000 ohms/volt or more sensitivity to measure the potential across the resistor.
4. Check each exposed metallic part, and measure the voltage at each point.
5. Reverse the polarity of the AC plug in the AC outlet and repeat the above measurements.
6. The potential at any point should not exceed 0.75 volt RMS. A leakage current tester (Simpson Model 229, RCA WT-540A or equivalent) may be used to make the hot checks.

Leakage current must not exceed 0.5 milliamp. If a measurement is outside of the specified limit, there is a possibility of a shock hazard and the monitor should be repaired and rechecked before it is returned to the customer.

How to Find A Good Earth

A cold water pipe is a guaranteed earth ground; the cover plate retaining screw on most AC outlet boxes is also at earth ground. If the retaining screw is to be used as your earth ground, verify that it is at ground by measuring the resistance between it and a cold water pipe with an ohmmeter. The reading should be zero (0) ohms. If a cold water pipe is not accessible, connect a 60-100 watt trouble light (not a neon lamp) between the hot side of an AC power receptacle and the retaining screw. Try both slots, if necessary, to locate the hot side of the line. The lamp should light at normal brilliance if the screw is at ground potential



How to Check for Earth Ground

Table of Contents

Section 1.
Product Specification

1.1.Monitor Control Locations & Functions 1-1
1.2.Product Overview 1-2
1.3.CRT Characteristics 1-2
1.4.Power Specifications 1-2
1.4.1.Power Supply 1-2
1.4.2.Power Management 1-2
1.5.Video Specifications 1-2
1.5.1.Video Amplifier Performance 1-2
1.5.2.Video Input Signal Characteristics 1-2
1.6.Sync Input Signal Characteristics 1-2
1.6.1.Separate Sync 1-2
1.6.2.Composite Sync 1-2
1.6.3.Sync On Green 1-3
1.7.Environmental 1-3
1.7.1.Temperature/Humidity/Altitude 1-3
1.7.2.Vibration Test 1-3
1.7.3.Drop Test 1-3
1.8.Preset Timing Modes 1-3

Section 2.
Disassembly Instructions

2.1.Removing the Rear Cover 2-1
2.2.Remove Top Shield and Rear Shield 2-1
2.3.Internal Disassembly (Right Side) 2-1
2.4.Internal Disassembly (Left Side) 2-1
2.5.Removing the Neck Board & Main Board 2-2
2.6.Remove the Control Board 2-2

Section 3.
Theory of Operation

3.1.Switching Power Supply 3-1
3.1.1.Auto-degaussing 3-2
3.1.2.Suspend Mode Operation 3-2
3.2.The Deflection Circuit 3-2
3.2.1.IC301 LM1291 Video PLL System for Continuous-Sync 3-2
3.2.2.IC301 LM1291 Pin Descriptions 3-4
3.2.3.IC302 LM1295 DC Controlled Geometry Correction System 3-5
3.2.4.IC302 LM1295 Pin Descriptions 3-5
3.2.5.Vertical Deflection Circuit 3-6
3.2.6.Geometry Correction Circuit 3-7
3.2.7.Structure of Horizontal Deflection Circuit 3-7
3.2.8.X-RAY Protection Circuit 3-12
3.2.9.The Focus Circuit 3-12

3.2.10.Horizontal linearity and CS Switching
3.3.Video Amplifier
3.4.Microprocessor And Sync Processing

Section 4.
Setup Adjustments

4.1.Preparing the Display for Adjustment
4.1.1.Test Equipment Required
4.2.Adjustment Procedures
4.2.1.Adjustment Sequence
4.2.2.Preset Timings Used During Adjustment
4.3.High Voltage Verification
4.4.G1 Voltage Adjustment
4.5.Background Brightness Setting
4.6.Screen Brightness Adjustment
4.7.Magnetic Field Configuration
4.8.Raster Center Verification
4.9.Tilt Verification
4.10.Focus Verification
4.11.Color Misconvergence
4.12.Primary Test Mode Performance Adjustments
4.13.Performance Adjustments for All Preset Modes
4.14.Image Performance Verification
4.15.Uniformity Verification
4.16.Brightness Verification
4.17.Display Size Stability
4.18.Color Purity Verification
4.19.Video Noise
4.20.Power Saving Check
4.21.DDC 1/2 Data Writing

Section 5.
Troubleshooting

5.1.No Display at Power-on
5.2.No X-ray Operation
5.3.No Video Operation
5.4.Poor Vertical Linearity
5.5.Poor Horizontal Linearity
5.6.Poor Uniformity
5.7.Tilted Display Area
5.8.Misconvergence
5.9.Poor Regulation
5.10.Poor Focus
5.11.Poor Geometry Distortion

Section 6.
Printed Circuit Boards

6.1.Neck Board
6.2.Main Board

6.3.Control Board 6-3
6.4.PCB Wiring Connection 6-3

Section 7.
Schematic Diagrams

7.1.Video Circuit Diagram 7-1
7.2.Deflection & S/P/S & Logic Circuit Diagram 7-1

Section 8.
Mechanical Parts

8.1.Key to Exploded View 8-1
8.2.Exploded View 8-2

Section 9.
PCB Component List

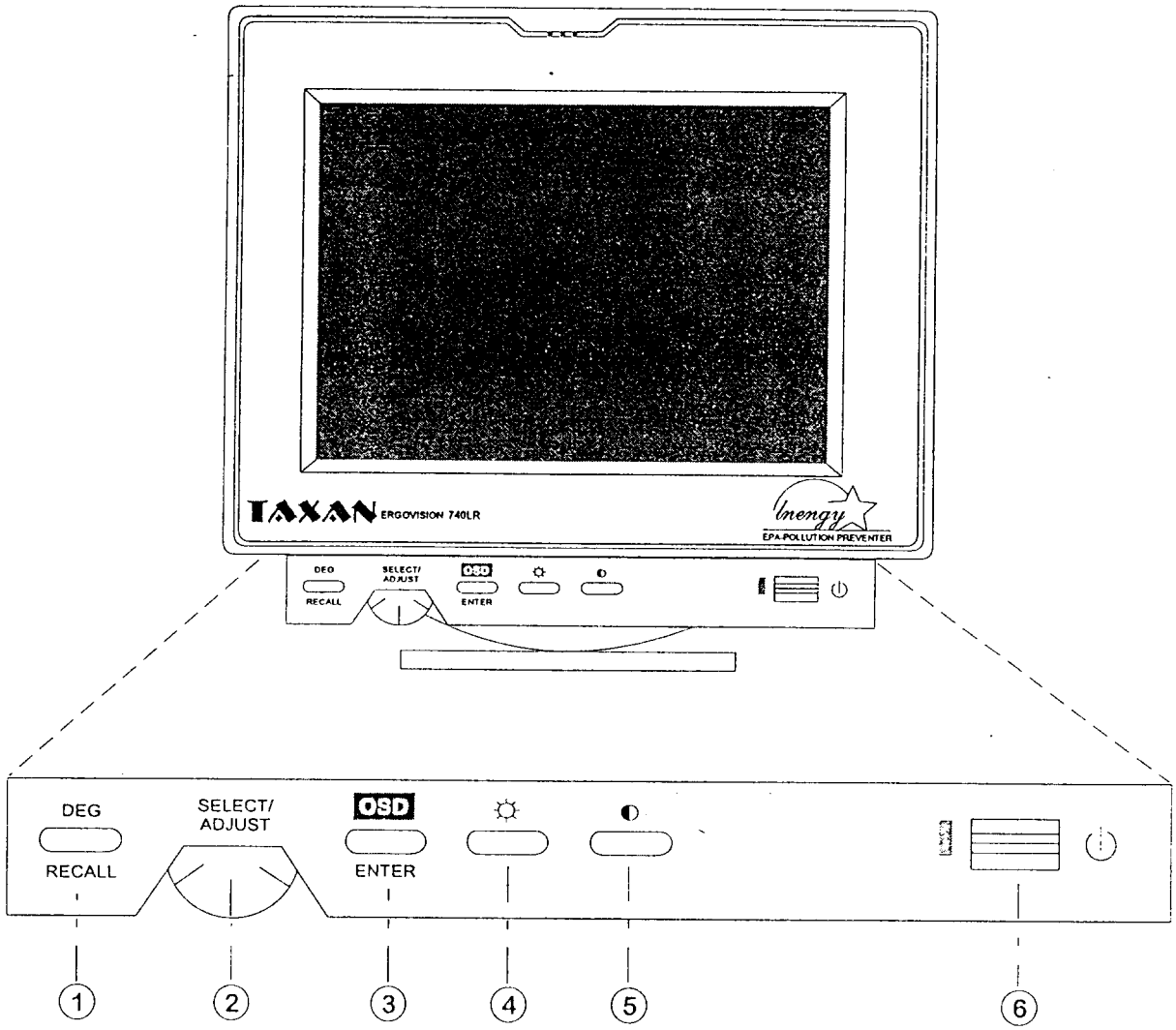
9.1.Explanation of Parts Listing 9-1
9.2.Main Board 9-1
9.3.Neck Board 9-7
9.4.Control Board 9-9
9.5.HITACHI CRT Different List 9-9
9.6.TOSHIBA CRT Different List 9-9

Section 1.

Product Specification

1.1. Monitor Control Locations and Functions 1-1
1.2. Product Overview 1-2
1.3. CRT Characteristics 1-2
1.4. Power Specifications 1-2
1.5. Video Specifications 1-2
1.6. Sync Input Signal Characteristics 1-2
1.7. Environmental 1-3
1.8. Preset Timing Modes 1-3

1.1. Monitor Control Locations & Functions



KEY TO BUILT-IN MONITOR CONTROL FUNCTIONS		
(1)	Manual Degauss and Factory Setting Recall Function	Digital control for manual degauss of monitor at the normal condition and for recall the origional factory setting, during OSD pattern is on screen.
(2)	Thumbwheel for Adjusting Setting and OSD Function Selection	Thumbwheel for adjusting the setting, clockwise for increasing and counterclockwise for decreasing and selection the OSD function icon.
(3)	Push Button for OSD ON/OFF and Thumbwheel Enter Confirm	Press to call up OSD function into screen and confirm the thumbwheel enter for icon.
(4)	Brightness Control Button	Increase / decrease raster black level using thumbwheel adjusting, clockwise for increasing and counterclockwise for decreasing.
(5)	Contrast Control Button	Increase / decrease video gain using thumbwheel adjusting, clockwise for increasing and counterclockwise for decreasing.
(6)	Power On/Off	Hard power On/Off button. Adjacent LED is lit when on. The LED color is green for normal condition and change to orange for DPMS condition.

1.2. Product Overview

The monitor installed in the EV740LR (RMH 7H11) phom described in this service manual has the following features:

- ☐ 17 inches 0.26mm dot pitch conventional CRT
- ☐ 30-85 kHz horizontal scanning
- ☐ Thirteen preset modes
- ☐ Universal segmented auto range power supply
- ☐ VESA/NUTEK/EPA compliant power management

1.3. CRT Characteristics

- ☐ Screen Size..... 17 inches
- ☐ Faceplate Type..... Fs
- ☐ Orientation..... Landscape
- ☐ Phosphor Dot Pitch ..... 0.26mm, delta arrangement
- ☐ Electron Gun 29mm,Precision-In-Lin
- ☐ Deflection Angle ..... 90 degree diagonal
- ☐ Shadow Mask..... Invar
- ☐ Phosphor Type..... P22
- ☐ Phosphor Persistence..... Medium Short
- ☐ Faceplate Properties..... ASN coating, anti-static, anti-reflection
- ☐ Standard Light Transmission... 53.5% Typical

1.4. Power Specifications

1.4.1. Power Supply

- ☐ A/C Receptacle IEC320
- ☐ Power Supply Type ..... Universal
- ☐ A/C Line Voltage Ranges 88VAC-132VAC 180VAC-264VAC
- ☐ A/C Line Frequency Ranges ... 50Hz/60Hz±3Hz
- ☐ Inrush Current ..... 30A/132V or 50A/264V (at cold start)
- ☐ Leakage Current..... ≤3.5mA
- ☐ Degauss ..... Automatic and Manual (20 minutes for a full recovery)

1.4.2. Power Management

☐ Summary of operating states:

APM State	LED Color	Power Consumption	Automatic Recovery Time
on	green	<150W	not applicable
standby	orange	<30W	<3 seconds
suspend	orange	<8W	<10 seconds
off	orange	<8W	<10 seconds
self test	green	<150W	not applicable

- ☐ Signaling compliant with VESA DPMS guidelines
- ☐ Nutek 1992 guidelines..... suspend < 30 watts; off < 8 watts
- ☐ EPA energy star..... standby < 30 watts

1.5. Video Specifications

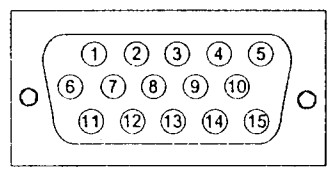
1.5.1. Video Amplifier Performance

- ☐ Bandwidth (dot rate)..... 135MHz
- ☐ Typical 10%~90% rise and fall times calculation 5.5ns
- ☐ Video generator rise/fall times . 2ns maximum
- ☐ Scope and probe bandwidth ... 350MHz minimum
- ☐ Probe capacitance 2.5Pf
- ☐ Overshoot/Undershoot ..... 10% maximum
- ☐ Sync on green ..... Amplitude:714mV maximum Sync on Green Amplitude:286mV maximum

1.5.2. Video Input Signal Characteristics

- ☐ Video Type ..... Analog
- ☐ Amplitude ..... 700mV maximum
- ☐ Video Input Impedance..... 75 Ohms±1%
- ☐ Optional DDC 1/2B Video Connector Pin Assignments:

pin	Signal	pin	Signal
1	Red video	9	No pin
2	Green video	10	Sync return
3	Blue video	11	Monitor GND
4	Monitor GND	12	SDA(bi-directional)
5	No pin	13	H. sync
6	Red return	14	V. sync (VCLK)
7	Green return	15	SCL
8	Blue return		



1.6. Sync Input Signal Characteristics

1.6.1. Separate Sync

- ☐ Sync Type ..... TTL
- ☐ Amplitude ..... 2.4V minimum (Logic High), 0.8V max.(Logic Low)
- ☐ Polarity ..... Positive or Negative
- ☐ Equalization pulses ..... Not allowed

1.6.2. Composite Sync

- ☐ Sync Type ..... TTL
- ☐ Amplitude ..... 2.4V minimum (Logic High), 0.8V max.(Logic Low)

- ☐ Polarity ..... Positive or Negative
- ☐ Serration pulses ..... Allowed at horizontal rate
- ☐ Equalization pulses ..... Not allowed

1.6.3. Sync On Green

- ☐ Sync Type ..... As per Apple
- ☐ Amplitude ..... 0V min(Logic High) -286mV max.(Logic Low)
- ☐ Polarity ..... Negative/Composite
- ☐ Serration pulses ..... Allowed at horizontal rate
- ☐ Equalization pulses ..... Not allowed

1.7. Environmental

1.7.1. Temperature/Humidity/Altitude

OPERATING

- ☐ Temperature ..... 10°C to 35°C
- ☐ Relative Humidity ..... 0 to 90%, non-condensation
- ☐ Altitude ..... 0 to 10,000 feet

NON-OPERATING

- ☐ Temperature ..... -40°C to +65°C
- ☐ Relative Humidity ..... 0 to 95%, non-condensation
- ☐ Altitude ..... 0 to 40,000 feet

1.7.2. Vibration Test

UNPACKED UNIT

Operating without package:

	Frequency	Amplitude	Acceleration(G)
1	5-22Hz	0.25mm	-
2	22-500Hz	-	0.25G

Times/Cycle:

- ☐ Rise Time ..... 10 Minutes
- ☐ Fall Time ..... 10 Minutes
- ☐ Number of Sweeps ..... 1 Cycle
- ☐ Axis ..... X,Y,Z
- ☐ Total Times ..... 60 Minutes

PACKAGED UNIT

Storage with package:

	Frequency	Amplitude	Acceleration(G)
1	5-50Hz	-	0.83G
2	-	-	-

Times/Cycle:

- ☐ Rise Time ..... 10 Minutes
- ☐ Fall Time ..... 10 Minutes
- ☐ Number of Sweeps ..... 1 Cycle
- ☐ Axis ..... X,Y,Z
- ☐ Total Times ..... 60 Minutes

1.7.3. Drop Test

- ☐ Compliant with NSTA Project 1A guidelines
- ☐ Drop Height 46cm
- ☐ Test Direction ..... 1 Corner, 3 Edges, 6 Faces

1.8. Preset Timing Modes

This display has 13 preset display modes configured during manufacture, given in the following table:

Model No.	Hf KHz	Vf Hz	Dot x Line
01	79.976	75.025	1280x1024
02	68.677	84.997	1024x768
03	60.023	75.029	1024x768
04	58.230	72.245	1024x768
05	53.674	85.061	800x600
06	48.044	72.140	800x600
07	46.875	75.000	800x600
08	43.269	85.008	640x480
09	37.736	72.570	640x480
10	37.500	75.000	640x480
11	31.469	59.942	640x480
12	31.469	70.080	640x400
13	31.470	70.080	640x350

Section 2.

Disassembly Instructions

2.1. Removing the Rear Cover. 2-1
2.2. Removing the Top Shield and Rear Shield. 2-1
2.3. Internal Disassembly (Right Side). 2-1
2.4. Internal Disassembly (Left Side) 2-1
2.5. Removing the Neck Board and Main Board 2-2
2.6. Removing the Control Board. 2-2

2.1. Removing the Rear Cover

1. Remove the four screws at the rear of the display. Refer to the figure 2-1 (A).
2. Remove the rear cover.

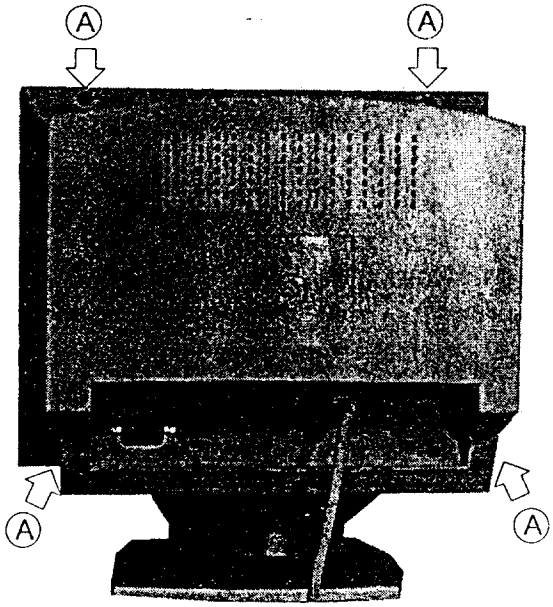


Figure 2-1 Remove the Rear Cover

2.2. Remove Top Shield and Rear Shield

1. Disconnect the five ground wires from the top shield. Refer to the figure 2-2 (A).
2. Remove the two screws at the top shield. Refer to the figure 2-2 (B).
3. Disconnect the two ground wires from the top shield. Refer to the figure 2-3 (A).
4. Remove the two screws at the top shield. Refer to the figure 2-3 (B).
5. Release the cord cramp from the top shield. Refer to the figure 2-3 (C).
6. Remove top shield and rear shield.

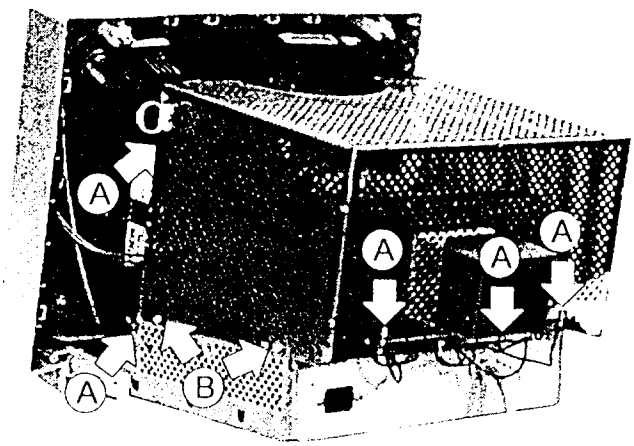


Figure 2-2 Remove the Top Shield & Rear Shield

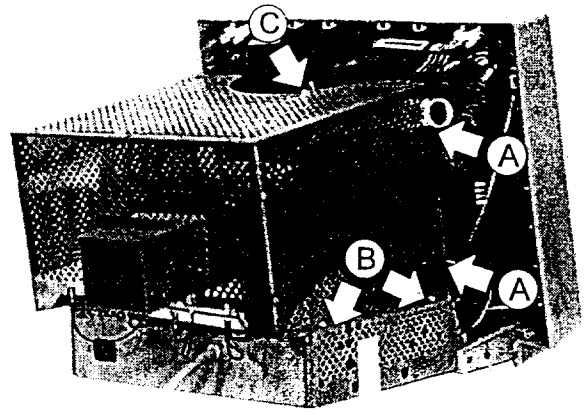


Figure 2-3 Remove the Top Shield & Rear Shield

2.3. Internal Disassembly (Right Side)

The neck board is plugged on to the CRT neck and is enclosed in a metal shielding.

1. Disconnect the two ground wires. Refer to the figure 2-4 (A).
2. Remove the connected pin from the Neck Board. Refer to the figure 2-4 (B).
3. Remove the two connected pins from the Main Board. Refer to the figure 2-4 (C).
4. Remove the connected pin from the Main Board to Control Board. Refer to the figure 2-4 (D).
5. Remove the two screws at the bezel. Refer to the figure 2-4 (E).
6. Remove the nylon revets holding from Bezel. Refer to the figure 2-4 (F).

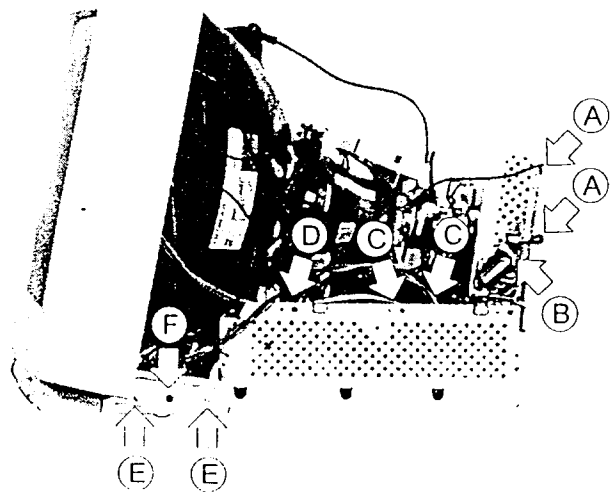


Figure 2-4 Internal Disassembly (Right Side)

2.4. Internal Disassembly (Left Side)

1. Disconnect the ground wire. Refer to the figure 2-5 (A).
2. Remove the connected pins from the Main Board. Refer to the figure 2-5 (B).

IMPORTANT NOTE

To avoid risk of electric shock, before removing the anode cap, made sure tdhe anode has been completely discharged as high voltage may remain on the anode for extended time after power off.

3. Remove the anode cap from the CRT. Refer to the figure 2-5(C).
4. Remove the two screws at the bezel. Refer to the figure 2-5 (D).
5. Remove the nylon revets holding from bezel. Refer to the figure 2-5 (E).

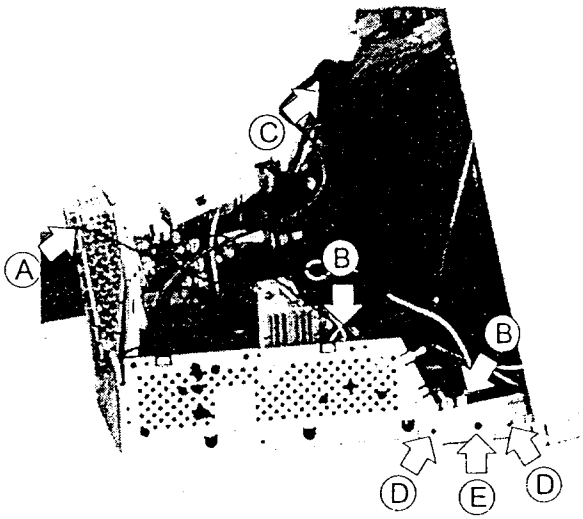


Figure 2-5 Internal Disassembly (Left Side)

2.5. Removing the Neck Board & Main Board

1. Disconnect the three ground wires from the Neck Shield. Refer to the figure 2-6 (A).
2. Remove the neck shield.
3. Remove the Neck Board.
4. Remove the Main Board.

2.6. Remove the Control Board

1. Remove the four screws from the Control Board. Refer to the figure 2-7 (A).
2. Remove the Control Board.

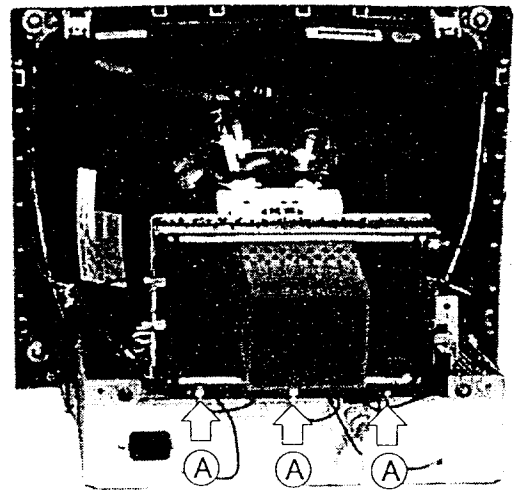


Figure 2-6 Remove Neck Board & Main Board

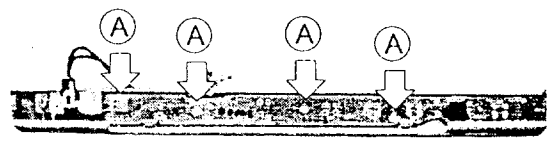


Figure 2-7 Remove the Control Boaed

Notes

Section 3.
Theory of Operation

3.1. Switching Power Supply 3-1
3.2. The Deflection Circuit 3-2
3.3. Video Amplifier 3-12
3.4. Microprocessor and Sync Processing. 3-13

3.1. Switching Power Supply

The switching power supply (SPS) used in this display is a 150W flyback mode type. The power supply provides seven outputs (B+, 77V, 15V, -15V, 6.3V ,+15V and +5V). Please refer to schematic diagram for details of the circuit layout. The input voltage is from 88VAC — 264VAC with an input frequency of 47Hz — 63Hz. as shown in figure 3-1.

The current first passes through the EMI control circuit and is regulated to DC by the bridge diodes (BD901) and filter capacitor (C907). During rectification a large current surge is generated and as C907 has a very low impedance while being charged the fuse, on/off switch and bridge diode are all liable to be damaged. For this reason, a thermal resistor (NTCR) is added before the bridge diode in order to limit the large current surge generated during the charging of the capacitor.

During rectification, C910 is charged through R903 and R904. When C910 is charged to 16V, IC901 3842A starts to operate (for details, of the functions of this IC, please refer to the relevant data sheet) and outputs a pulse signal from Pin 6 to set the transistor Q902 in the ON state. At this time, transformer T903, which is connected in parallel, starts to store power. When the current passing through the resistor R914, and the supplementary current from R957 and R964 into Pin 3 of IC901 reaches 1.1V, IC901 is reset, causing the energy stored by the transformer to reach the rated value. In order to prevent the transformer from being saturated and causing damage to the transistor, when transistor Q902 is in the OFF state, the energy stored in the transformer T903 is released into the secondary coil and is regulated through the various output loops and filters and converted to the required DC output. In addition to this, at the appropriate time, the windings pin1 — pin2 supply Pin 7 of IC901 with a fixed power supply for normal operation. Also, when windings pin2 — pin3 are in power saving active state, power is supplied to Pin 7 of IC901 for normal operation.

In any of the above cased, the output pulse is terminated and the FET is turned off, causing the voltage on the output of the FET to rise rapidly, and the voltage across the winding of the primary to reverse in polarity, thus tending to reset the flux within the core. At this point, the diodes D915, D925, D917-D920 and D926 on the secondary supply winding become forward biased and begin to conduct, thus transferring energy from primary to the secondary, and charging the secondary capacitors.

There is also secondary winding the primary side of the power supply which, through diode D908 and Q901 recharges the control IC901 reservoir capacitor C910. This supply then keeps the IC901 running. In the event of a secondary short circuit, the supply fails to recharge, thus the voltage across C910 drops to a threshold limit below which the IC901 cuts out and returns to its low current load operation.

During normal operation, the supply rails charge until the error amplifier realized by IC903 on the secondary begins to turn on the opto-coupler, PH901. At this point, the photo-transistor of this opto-coupler on the primary side begins to conduct, draining current from the primary control IC901 supply through diode D907 and D928.

Under normal operation IC903 regulates the current flow through PH901, and hence determines the output voltage of the error amplifier internal to IC901. Various passive components around IC903 and IC901 set the gain compensation for optimum stability and regulation characteristics.

In the event of a fault condition occurring, either Q904 may be turned on by the lack of voltage at pin2 of IC901 or zener diode ZD903 may conduct, due to excessive voltage on the primary IC901 supply. In the latter case, the triac Q903 will fire, thus dragging down the output of the control IC901 error amplifier, which in turn will limit the duty cycle and reduce the output voltage. It will stay in this mode until the AC input power is removed.

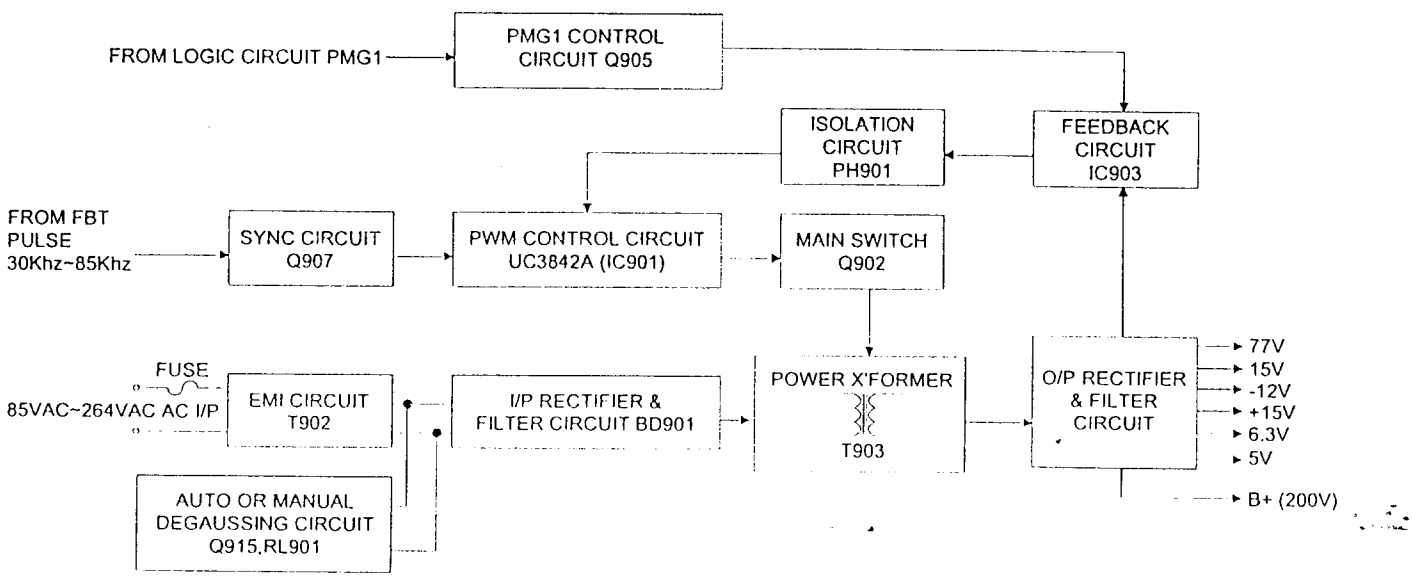


Figure 3-1 Switching Power Supply Block Diagram

When the feedback signal passing through the main 77V output is completed, the transistor's duty cycle is adjusted through the transfer to Pin 2 of IC901 3842A of the primary coil by PH901 4N35 and IC903 TL431, stabilizing the output current. At this time, it is important to note that before the feedback signal is established, the charge level of C917 cannot trigger Q903 SCR or it will cause a faulty power startup. In addition, in order to synchronize the supply power and monitor and reduce noise that will cause interference to the display, in the area D913 the monitor's feedback transformer gets a feedback signal in order to ensure synchronization between the power supply and monitor, with synchronization in the range 30kHz — 85kHz. Because the power operating frequency changes with the monitor causing changes in the value of IP, (the value of LP is fixed while the value of IP increase or decreases according to the frequency), this affects the test value of Pin 3 of IC901 3842A. This causes the total power supplied to vary according to the frequency, so a compensation value is provided by D914 in order to reduce the difference in total power for different frequencies. In addition, because the AC input ranges from 85VAC to 264VAC, this causes the value of the direct current on the DC bus to vary, affecting the rise rate of IP, the oscillator and the duty cycle, and causing the test value obtained at Pin 3 of IC901 to vary. To resolve this, a compensation value is provided by R964 and R957 which reduces the difference resulting from the different input voltages.

3.1.1. Auto-degaussing

When base of Q915 connector is in high state, the transistor Q915 2SC945P is on, causing the relay to jump from Normal Open (N.O.) to Normal Close (N. C.) to perform auto-degaussing operations. The duration of this operation is controlled by a logic pulse and lasts approximately 6 (six) seconds. When transistor Q915 enters the OFF state and the relay returns to N.O. to terminate the auto-degaussing operation is completed.

3.1.2. Suspend Mode Operation

Two feedback ratios can be selected, both sensing from the 78V rail. In the event of Q905 being turned on by micro processor, additional current is drawn from the virtual earth node of IC903, thus causing the power supply to serve the rail to a high voltage, nominally 78V. This is trimmed by resistor R937, R940 and R941. The other supply rail are predetermined ratios of this winging, being +15V,-12V,+6.3V and +200V nominally. In addition, a low voltage primary side winding feeds the control IC901 directly through D907 turning off the control IC901 supply through Q901, which would otherwise dissipate excessively.

When Q905 is turned off, the 78V rail drop to around 17V. In this case, the primary control supply fed through D907 drops to a value that is below the level needed to sustain operation. Instead, Q901 begins to conduct and the higher voltage supply winding taken via D908 is used to keep the primary side powered up with minimal power losses.

The 5V power supply is driven by one of two sources, In normal operation when the 78V is present, the 5V regulator, IC902 is fed from the 15V rail through diode D921. When switched to standby mode (78V rail drops to 12V) then the 15V rail drops too low to supply IC902. In this case Q906 take over and maintains the supply to IC902 at around 9V.

In addition to the 5V regulated supply, in normal operation there is also a 15V regulated supply take from the 15V rail.

To ensure that micro processor gets a good 5V power supply, there is a power good detection circuit formed by Q801 and Q802. This monitors the supply going into the 5V rail (not the 5V rail directly). It detects whether there is sufficient voltage to enable the 5V regulator to work effectively. It is not a detection of the 5V rail itself, but relies upon the premise that the regulator is not faulty and that there is no faulty load condition on the 5V.

During power up, there is a delay to the signal at the output of the threshold comparator Q801 and Q802 a caused by ZD801 and C801, in order to allow the micro circuit time to stabilize. The threshold is chosen such that the RESET line drops low at least 25ms before the 5V drop out of regulation.

Finally a synchronization pulse taken from the horizontal output stage maintains the SMPS operating frequency in sync with the horizontal scan. D913 injects a pulse which prematurely triggers the oscillator within IC901 which would otherwise run at a frequency lower than the minimum required sync frequency.

3.2. The Deflection Circuit

Please refer to the block diagram of the deflection circuit and video circuit and Logic circuit as shown in figure 3-2.

3.2.1. IC301 LM1291 Video PLL System for Continuous-Sync

The LM1291 is an integrated horizontal time base solution specifically designed to operate in continuous-sync video monitors. It automatically synchronizes to any H ferquency from 30kHz to 85kHz and provides the drive pulse to the high power deflection circuit.

Available sync processing includes a vertical sync separator and a composite video sync stripper. An internal sync selection scheme gives highest priority to separate H and V sync, then composite sync, and finally sync on video, no external switching between sync sources is necessary. The LM1291 provides polarity-normalized H/HV and V sync outputs, along with logic flags which show the respective input polarities.

The design uses an on-chip FVC (Frequency to Voltage Converter) to set the center frequency of the VCO

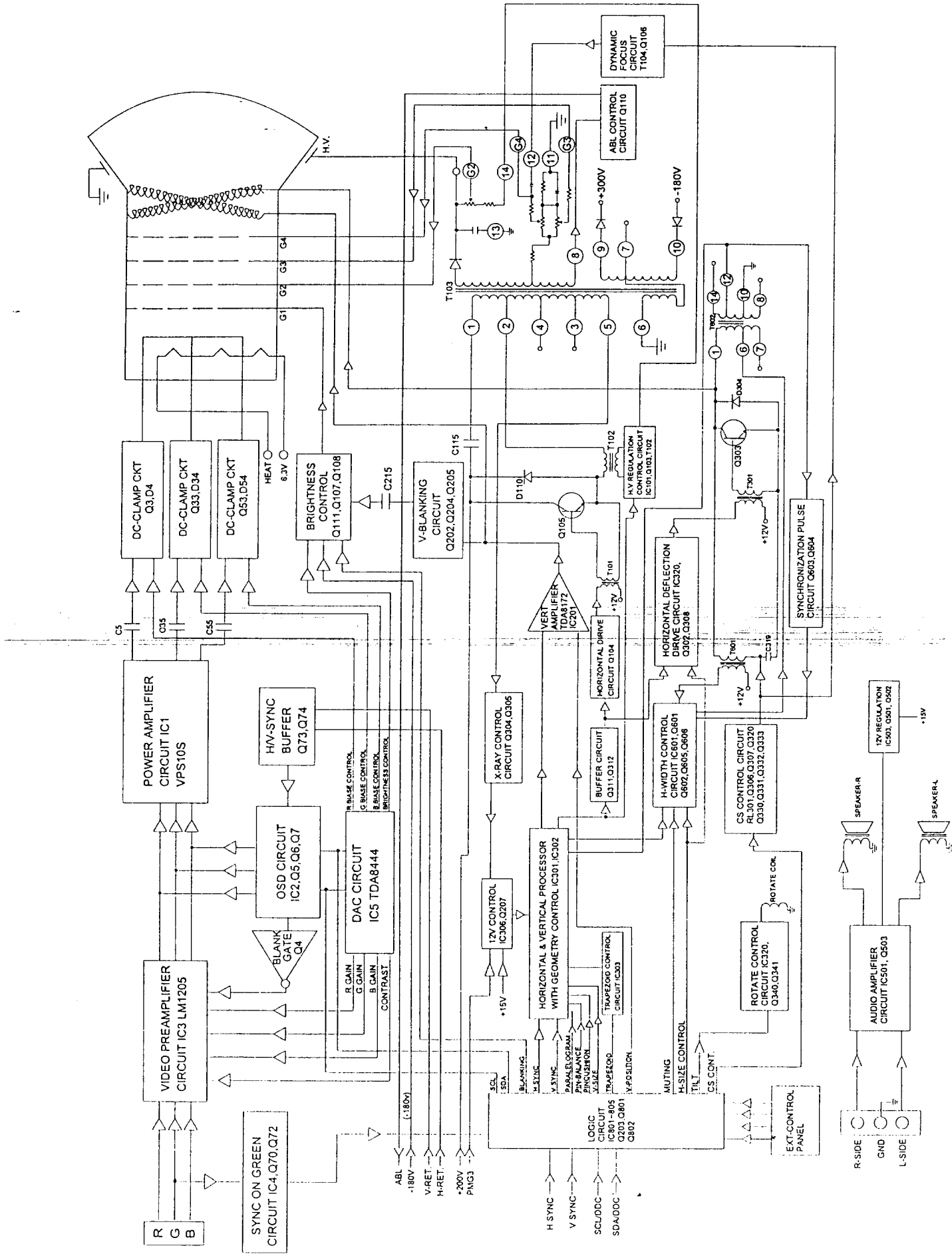


Figure 3-2 Video,Logic,Audio and Deflection Block Diagram

(Voltage Controlled Oscillator). This technique allows autosync operation over the entire frequency range using just one optimized set of external components.

The system includes a second phase detector which compensates for storage time variation in the horizontal output transistor, the picture's horizontal position is thus independent of temperature and component variance.

The LM1291 provides DC control pins for H drive duty cycle and flyback phase.

3.2.2. IC301 LM1291 Pin Descriptions

Pin 1 Clamp Control:
This low impedance current mode. When there is no H sync in sync-tip mode, the clamp pulse is generated by the VCO at the frequence preset by pin 5. This feature is intended for use in on screen display system.

Pin 2 Clamp pulse:
Active -low clamp pulse output.

Pin 3 Video Mute:
This open-collector output produces an active-low pulse when triggered by a step change of H sync frequency.

Pin 4 F-Max:

A resistor from this pin to ground sets the upper frequency limit of the VCO.

Pin 5 F-Min:
A resistor from this pin to ground sets the lower frequency limit of the VCO.

Pin 6 Voltage Refer CAP:
This is the decoupling pin for the internal 8.2V reference.

Pin 7 VCC:
12V nominal power supply pin.

Pin 8 Vertical Sync In:
This pin accepts AC-coupled vertical sync of either polarity.

Pin 9 Composite Video In:
The composite video sync stripper is active only when no signal is present at pin 12 (H/HV In). The signal to pin 9 must have negative going sync tips which are at least 0.14V below black level.

Pin 10 H/HV CAP:
A capacitor is connected from this pin to ground for detecting the polarity and existence of H/HV sync at pin 12.

Pin 11 H/HV Sync Out:
The sync processor outputs active-low H/HV sync derived from the active sync input (pin 9 or pin 12). Pin 11 stays low in the absence of sync input.

Pin 12 H/HV Sync In:
This pin accepts AC-coupled H or composite sync of either polarity.

Pin 13 H/HV Pol Out:
A low logic level indicates active-high H/HV sync to pin 12, a high level indicates active-low. Pin 13 stays low in the absence of H/HV sync.

Pin 14 H Drive Duty Control:
A DC voltage applied to this pin sets the duty cycle of the horizontal drive output (pin 20) . With a range of approximately 30%~70%. 2V sets the duty cycle to 50%.

Pin 15 H Drive EN:
A low logic level input enables H-Drive out (pin 20).

Pin 16 X-ray Shut Down:
This pin is for monitoring CRT anode voltage. If the input voltage exceeds an internal threshold. H-Drive out (pin 20) is latched high and video mute (pin 3) is latched low. Vcc has to be reduced to below approximately 2 V to clear the latched condition, i.e power must be turned off.

Pin 17 Vertical Sync Out:
The sync processor outputs active-low vertical sync derived from the active sync input (pin 8, pin 9 or pin 12). Pin 7 stays low in the absence of sync input.

Pin 18 Flyback In:
Input pin for phase detecor 2. For best operation, the flyback peak should be at least 5 V but not greater than Vcc. A pulse width greater than 1.5μs is acceptable.

Pin 19 Vertical POL Out:
A low logic level indicates active-high vertical sync to pin 8, a high level indicates active-low. Pin 19 stays low in the absence of vertical sync.

Pin 20 Horizontal Drive Out:
This is an open-collector output which provides the drive pulse for the high power deflection circuit. The pulse duty cycle is controlled by pin 14.

Pin 21 Ground:
System ground. For best jitter performance, all LM1291 filter components and bypass capacitors should be connected to this pin via short paths.

Pin 22 Phase Detector 2 CAP:
The low-pass filter cap for the output of phase detector 2 is connected form this pin 21 (GND) via a short path.

Pin 23 Horizontal Drive Phase:
A AC control voltage applied to this pin sets the phase of the flyback pulse with respect to the leading edge of horizontal sync.

Pin 24 Vertical CAP:
A capacitor is connected from this pin to ground for detecting the polarity and existence of vertical sync at pin 8.

Pin 25 FVC CAP 2:
Secondary FVC filter pin. Cfvc 2 is connected from this pin to ground. The width of the video mute (pin 3) pulse is controlled by the time constant difference between the filter at pins 25 and 26.

Pin 26 FVC CAP 1:
Primary FVC filter pin. Cfvc 1 is connected from this

pin to pin 21 (GND) via a short path. The voltage at this pin is buffered to pin 27 (FVC out).

Pin 27 FVC Out:
Buffered output of the frequency-to-voltage converter, which sets the VCO center frequency through an external resistor to pin 28. Care should be taken when further loading this pin, since during the vertical interval it presents a high output impedance. Excessive loading can cause top-of-screen phase recovery problems.

Pin 28 PD 1 Out/VCO In:
Phase detector 1 has a gated charge pump output which requires an external low-pass filter. For best jitter performance, the filter should be ground to pin 21 (GND) via a short path. If a voltage soucrce is applied to this pin, the phase detector is disabled and the VCO can be contorlled directly.

3.2.3. IC302 LM1295 DC Controlled Geometry Correction System

The LM1295 is specifically designed for use in a continuous sync monitor. The injection-locked vertical oscillator operates from 50 Hz to 170 Hz, covering all known video monitors. A differential ouptut current is provided in order to prevent ground interaction.

The IC302 provides two outputs composed of the summation of DC controlled 1st and 2nd order ouptut terms. The first ouptut corrects for EW pincushion and trapezoid. The second corrects for parallelogram and bow.

A DC controlled output is provided for vertical dynamic focus correction.

3.2.4. IC302 LM1295 Pin Descriptions

Pin 1 Ground:
This pin should be connected to the power ground at pin 17.

Pin 2 Vertical Height:
A Voltage between 0V and 4V on this pin controls the amplitude of the +V and -V drive currents, with increasing voltage giving increasing current. The control range is approximately 1.8 to 1. The response time is low, being limited by the automatic level control loop.

Pin 3 4V CAP:
A C202 capacitor aluminum electrolytic or tantalum, should be connected between pin 3 and GND to bypass the internal 4V reference.

Pin 4 Vertical Sync In:
The vertical sync input takes a negative-going TTL level pulse which injection locks the vertical oscillator to the vertical sync frequency if it is above the LM1295 minimum frequency. The minimum pulse width is approximately 200ns. For free-running detection (no vertical sync in), this input should be at logic high.

Pin 5 8V CAP:
A C203 capacitor, aluminum electrolytic or tantalum, should be connected between pin 5 and GND (pin 17) to bypass the internal 8V reference.

Pin 6 Vertical Dynamic Heigh:
A voltage between 3V and 4V on this pin controls the amplitude of the +V and -V drive currents with increasing voltage giving increasing current. The control range is approximately 1.3 to 1.

Pin 7 Vcc:
Vcc should be bypassed to GND (pin 17) with a C216 aluminum electrolytic or tantalum capacitor. The supply voltage is 12V.

Pin 8 Voltage Reference CAP:
A C217 capacitor aluminum electrolytic or tantalum, should be connected between pin 8 and GND (pin 17).

Pin 9 Horizontal Dynamic width:
This output consists of the sum of the vertical ramp and the parabola derived from the ramp. The amplitude and polarity of the ramp signal is DC controlled by horizontal trapezoid control (pin 11) and of the parabola by E-W pin control (pin 10). The weighting of the ramp is 1/3 the parabola; i.e, with the horizontal trapezoid and E-W pincushion controls at 4V, the output is 3 parts parabola and 1 part ramp. Horizontal dynamic width is used to correct for trapezoid and east-west pincushion distortion.

Pin 10 E-W Pincushion Control:
A voltage of 0V to 4V adjusts the polarity and the amount of parabola in the horizontal dynamic width (pin 9) output. At approximately 2V, the amount is zero. From 2V to 4V, the amplitude increases and the parabola is positive-going. From 2V to 0V, the amplitude increases and the parabola is negative-going.

Pin 11 Horizontal Trapezoid Control:
A voltage of 0V to 4V adjusts the polarity and the amount of vertical ramp in the horizontal dynamic width (pin 9) output. At approximately 2V, the amount is zero. From 2V to 4V, the amplitude increases and the ramp is positive-going. From 2V to 0V, the amplitude increases and the ramp is negative-going.

Pin 12 Horizontal parallelogram control:
A voltage of 0V to 4V adjusts the polarity and the amount of vertical ramp in the horizontal dynamic center (pin 14) output. At approximately 2V, the amount is zero. From 2V to 4V, the amplitude increases and the ramp is positive-going. From 2V to 0V, the amplitude increases and the ramp is negative-going.

Pin 13 Horizontal Bow Control:
A voltage of 0V to 4V adjusts the polarity and the amount of parabola in the horizontal dynamic center (pin 14) output. At approximately 2V, the amount is zero. From 2V to 4V, the amplitude increases and the parabola is positive-going. From 2V to 0V, the amplitude increases and the parabola is negative-going.

Pin 14 Horizontal Dynamic Center:
This output consists of the sum of the vertical ramp and the parabola derived from the ramp. The amplitude and polarity of the ramp signal is DC controlled by horizontal parallelogram control (pin 12) and of the parabola by horizontal bow control (pin 13). The difference between

this output and the horizontal dynamic width output is in the weighting of the ramp, which is equal to the parabola; i.e with the horizontal parallelogram and horizontal bow controls at 4V, the output is 1 part parabola and 1 part ramp. Horizontal dynamic center is used to correct for parallelogram and bow distortion.

Pin 15 Vertical Dynamic Focus Control:
A voltage of 0V to 4V adjusts the polarity and the amount of parabola in the vertical dynamic focus (pin 16) output. At approximately 2V, the amount is zero. From 2V to 4V , the amplitude increases and the parabola is positive-going. From 2V to 0V, the amplitue increases and the parabola is negative-going..

Pin 16 Vertical Dynamic Focus:
This output consists of the parabola derived from the vertical ramp. The amplitude and polarity are controlled by vertical dynamic focus control.

Pin 17 Ground:
This is the power supply ground for the 12V supply and the point to which the bypass capacitors are returned.

Pin 18 Automatic Level Control CAP:
This capacitor (C204) is part of the level control circuit that maintains constant vertical height in spite of vertical sync frequency changes. If the VCO capacitor value is changed, the capacitor value should change in the same ratio. A R204 resistor should be connected from this pin to ground.

Pin 19 Double Frequency Capacitor:
This capacitor (C218) prevents the vertical oscillator from locking at twice the vertical sync frequrncy. If the VCO capacitor volue is changed, this capacitor value should change in the same ratio.

Pin 20 Oscillator Capacitor:
This is the vertical oscillator capacitor (C232). The value can be changed to change the minimum frequency.

Pin 21 Vertical Resistor:
One end of the vertical resistor connects to this pin. This resistor determines the gain of the vertical ramp current generator. The gain is inversely proportional to the resistance.

Pin 22 Vertical Resistor:
The other end of the vertical resistor connects to this pin.

Pin 23 Vertical Drive:
This is the negative-going vertical ramp output current of the differential pair. The ramp current waveform is superimposed on a direct current of approximately 315μA. The waveform amplitude is determined by the vertical height (pin 2) control voltage and the vertical dynamic (pin 6) control voltage. The current can be converted into voltage by a R236 resistor to ground or by a differential amplifier using the differential currents as inputs. The voltage compliance of the output is typically 6V.

Pin 24 + Vertical Drive:
This is the same as vertical drive except it is the positive-going output current of the differential pair.

3.2.5. Vertical Deflection Circuit

1. IC201 TDA8172 consists of a flyback generator, voltage stabilizer, drive circuit and vertical output amplifier.

2. **The vertical oscillator circuit**

   (a) The frequency and phase of the vertical oscillator circuit is generated by the vertical synchronization signal.

   (b) The synchronization signal is input from Pin 4 of IC302 LM1295, and after being processed by the synchronization circuit, is sent to the vertical synchronization oscillator circuit to trigger the vertical oscillator and synchronize the oscillator frequency with the external synchronization signal. The frequency of its internal free oscillation is set by the time constant of C232. It does not need an external F/V control because this IC302 can keep vertical synchronization. Pin 18 provides vertical A.L.C function. So the pin 18 of IC302 is use to maintain the difference between the free oscillation frequency and external synchonization signal frequency at a similar level and make the sawtooth wave amplitude from pin 24 of IC302 the same.

3. Vertical Size Control

   The pulse voltage output by the oscillator is sent to the sawtooth wave generator. The size and amplitude of the voltage of the sawtooth wave generation can be changed by DC value which output from Pin 35 (PWM) of IC801 and the vertical size can thus be controlled. This sawtooth wave voltage passes through a buffer and is output from Pin 24 of IC302 to pin 1 of IC201 TDA8172 of the vertical drive circuit.

   The vertical ramp and DC offset are also controlled by PWM output. The vertical ramp generated across C232 is buffered internally to IC302 by DC controlled variable gain stage. The voltage level is derived from pin 35 of IC801 (PWM) through the R210, R206 and C206 of grneration, then into pin 2 of IC302.

4. Vertical Drive Circuit

   (a) It is not sufficient to rely solely on the oscillator circuit output to ensure the stability of the vertical output, so a first or second level amplifier circuit must be inserted between the oscillator circuit and the output. This circuit is called the drive amplifier and in addition to amplifying the sawtooth wave also corrects the vertical linearity.

After adding the drive circuit, because the level of amplification can be considerable, enough negative feedback can be added to correct vertical linearity and increase the stability of the circuit.

(b) If the current of the sawtooth wave flowing through the deflection yoke is distorted, then the top and bottom portions of the display will be expanded or compressed, resulting in poor linearity. In order to solve this problem, correction of the linearity of the sawtooth wave can be carried out before the drive level.

5. **IC201 TDA8172 Vertical Drive Circuit**

The IC201 uses a double power source, so it can be viewed as an OCL drive amplification circuit.

In order that the DC coupled output stage accurate DC reference, a DC reference voltage is taken from pin 5 of IC302. This used as the reference voltage (via divider resistors, R214 and R216) for the DC coupled power amplifier IC201. This is a simple voltage to current inverting amplifier, using R223 to derive a voltage proportional to the current in the deflection winding of the yoke. This voltage is fed back to the virtual signal earth inverting input of the power amplifier(pin1) by R219. This back to back diode feedback network modifies the linearity of the transfer characteristic in order to give precept "S" correction linearity, in addition to the variable correction in the ramp generator.

The vertical output amplifier has a voltage boost circuit to triple the positive supply voltage during retrace in order to speed up flyback. It does this by charging capacitor C210 through diode D202 during the normal forward scan. Pin6 of the IC201 is the voltage supply to the power output stage. When flyback occurs, pin3 is switched to the positive supply rail on pin2, thus adding the voltage across C210 to that of the supply rail, effective doubling the supply momentarily.

6. **Vertical Centering Adjustment**

Since IC201 functions as an OCL circuit, VDC is output from Pin 7 of IC201, so the central current can be changed to shift the on-screen display up or down to prevent voltage fluctuation. After adjusting the power stabilizer at Pin 5 of IC302 LM1295 (about 8V) and R214, R216 this is input to Pin 7 of IC201 to change the value of the vertical center.

The DC operating point of the amplifier can be varied by the pin 38 of IC801 (vertical position) output and via R212, C207 and R213 to pin 7 of IC201 which adds or subtracts an offset into the output, thus varying the DC offset of the scan and hence the vertical centering.

3.2.6. Geometry Correction Circuit

1. If the width of the border in the center of the screen is insufficient, the waveform shown in Figure 3-3 below, can be used to add to horizontal deflection B+ in order to change the deflection of the horizontal deflection circuit. This waveform is the parabola obtained after regulation of the vertical period, and is created to perform amplitude modulation on the horizontal deflection current, as shown in Figure 3-4.

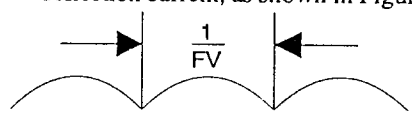
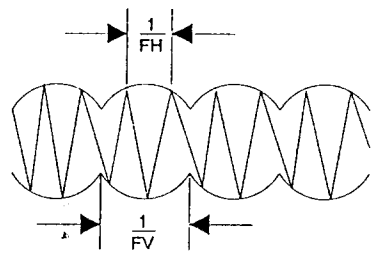


Figure 3-3 Voltage Correction Wave



FH: Horizontal Frequency
FV: Vertical Frequency

Figure 3-4 Current Correction Wave

2. The sawtooth wave is output from Pin 9 of IC302 and through C350 and R364 and input to Pin 2 of IC601 (DC to DC circuit). It is then output from Pin 6 of IC601 and after being sent to T603's second coil output, is added to horizontal B+ to provide pincushion and trapezoid distortion correction. So, is created to preform amplitude modulation on the horizontal deflection output pluse, as shown in figure 3-5.

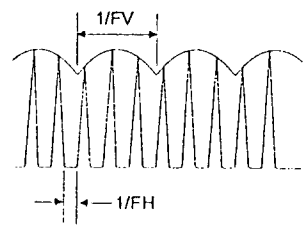


Figure 3-5 Collector of Q303 Output Pluse Correction Wave

3. The sawtooth wave is output from pin 14 of IC302 and through R353 and C314 and input to pin 23 of IC301. It is added to horizontal phase to provide parallelogram and bow distortion correction.

3.2.7. Structure of Horizontal Deflection Circuit

The function of the horizontal deflection circuit is to cause left/right scanning of the electron beam using

the sawtooth wave current flowing through the horizontal deflection yoke, and is made up of the horizontal oscillator circuit, horizontal drive circuit, horizontal output circuit, synchronous AFC circuit and high voltage generator circuit.

1. **Horizontal Drive Amplifier**
In order to rapidly saturate the output transistor (ON) or cut it off (OFF), a sufficient basic current must be provided. Because of this, an amplifier circuit is added between the oscillator circuit and the output circuit to amplify the pulse voltage. At the same time, after the waveform has been regulated, by adding this circuit to the output circuit, this amplification circuit functions as a drive amplifier.

IC301 LM1291 consists of a vertical sync selection polarity circuit, composite video sync stripper circuit, AFC circuit, H/V sync and composite sync circuit, voltage control oscillator circuit, phase regulator circuit, X-Ray circuit, video mute circuit, voltage regulator circuit and horizontal drive duty cycle circuit. This IC includes the vertical and horizontal circuits combined in one package.

When the synchronization signal input to logic circuit and pin 12 of IC301. The pin 20 of IC301 output horizontal frequency is achieved by the pin 1 of IC801 and flyback pulse from pin 12 of T602 (A.F.C) fed to pin 18 of IC301. So , the pin 20 of IC301 output horizontal frequency through Q311, Q312, Q302, Q104 T101 and T301 provide a horizontal output transistor base current of Q303 and horizontal anode voltage generator output transistor base current of Q105.

The horizontal output transistor base drive is taken from a conventional base drive transformer stage. This circuit as in a similar manner to a flyback power supply. The square wave horizontal oscillator output signal is coupled into the base of emitter drive stage transistor Q302, Q104, T301, T101 across the +15V supplies. This causes the primary current to increase linearly until such time as Q302 and Q104 turns off, hence storing a predetermined amount of flux energy in the transformer. As Q302 or Q104 turns off, and the primary current falls to zero, the secondary voltage is driven above the threshold of the base-emitter junction voltage of the horizontal output transistor Q303 or Q105. Current flows through R320, R321, L301, L302 and D303 into the base of Q303 or through R116, R150, L101 and D130 into the base of Q105 hence turning this device on. The high base current of around 1.1A. Lamps is so high that Q303 or Q105 is driven heavily into saturation. This is important in order that the collector voltage should be as low as low as possible whilst conducting the high peak currents that flow through the horizontal deflection winding. In turn, this is vital to limit dissipation.

At the required time as determined by the horizontal oscillator, the base drive transistor is turned back on. The voltage at Q302 or Q104 collector fall rapidly back towards the ground rail. However, the secondary current still remains flowing in a positive direction for a short time, due to the finite leakage inductance of T301 or T101. Also, due to the heavy saturation of Q303 or Q105, the base voltage remains at around 1V. The current in the secondary winding rapidly reverses and goes sharply negative as the charge stored within the base region of Q303 or Q105 is removed. D303 or D130 helps to speed up this charge removal. Note that during this time, the collector output of the Q303 or Q105 is still turned on, even though the base current is flowing out of the base.

This period of time is known as the storage time of the device and may take between 2-3us, depending upon peak collector current and temperature and various other design factors. Finally, when all charge in the base region of Q303 or Q105 is dissipated the base current suddenly stops, and the secondary current drops almost instantly to zero. At that point, the device now become non conducting and the collector current flow also terminates. The secondary voltage on T301 or T101 drops to it's unloaded voltage and the current flow in the primary settles to it initial value once more.

2. **Horizontal Equivalent Output Circuit**
The horizontal output circuit uses the switch operation of a transistor and a damping diode, and provides a sawtooth wave current to the deflection yoke. The horizontal deflection yoke is made up of the L value on the coil and resistance r inside the coil connected in series. Its resistance is extremely small, and the time constant (L/r) is extremely large. Because of this the voltage at the two terminals of the coil cause rapid variation in the current flowing in the coil still will slowly vary, creating a sawtooth current. The basic circuit and equivalent circuit are shown in Figures 3-6 and 3-7.

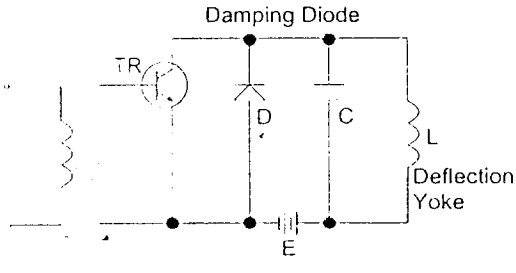


Figure 3-6 The Basic Deflection Circuit

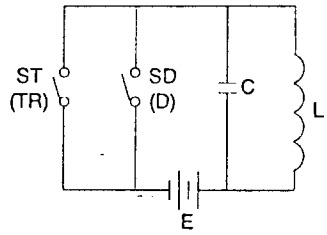


Figure 3-7 Equivalent Circuit

3. **Horizontal Output Equivalent Circuit Operation**

Refer to Figure 3-8 for the current wave of the voltage of the horizontal output circuit during operation.

(a) t1 — t2 Period

The base of the output transistor is added to the forward bias voltage. As the current through the base is very large, it will cause the output transistor to be saturated, corresponding to the ON state of S1 in the equivalent circuit. At this time the deflection yoke contains a current flow and because the time constant is large, the current will slowly show a linear increase as shown in Figures 3-8 (b) and 3-9 (a).

(b) t2-t3 Period

At t2, a negative load is applied to the base and the output transistor changes to OFF (S1 in open state). There is no current passing through the transistor at this time and the L and C components of the deflection yoke become independent oscillation circuits. If the current is suddenly cut off, then the polarity of the inverse voltage generated at L will be as shown in Figure 3-9 (b). This voltage is viewed as the source voltage and will cause current to flow, at which time the current flowing to C is as shown in Figure 3-8 (d). At time t3 this current is 0 but the voltage at the two capacitor terminals is at maximum. This waveform is known as flyback pulse, and is shown in Figure 3-8 (f).

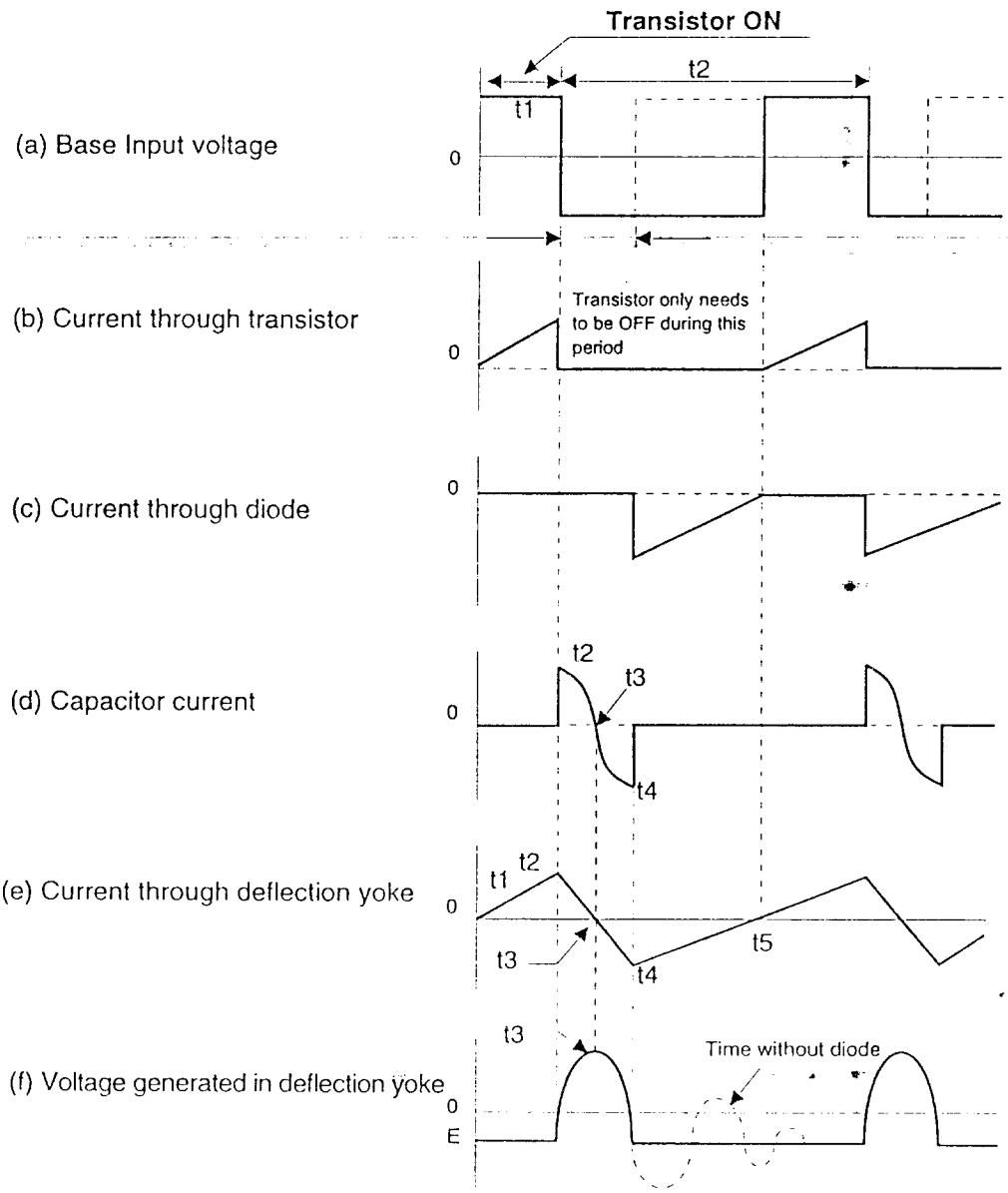
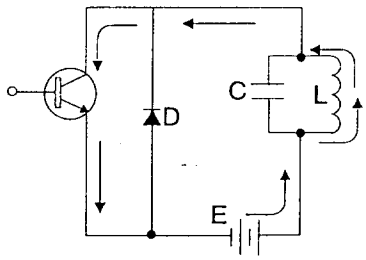
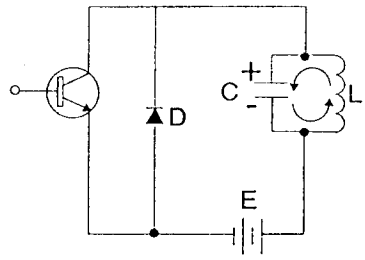


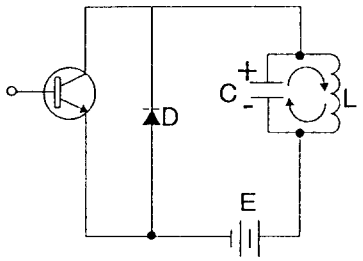
Figure 3-8 Horizontal Output Voltage/Current Waves



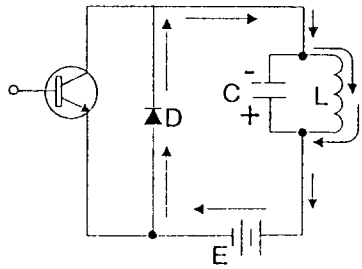
(a) Second half of scanning period (t1 - t2)



(b) First half of return line period (t2 - t3)



(c) Second half of return line period (t3 - t4),



(d) First half of scanning period (t4 - t5)

Figure 3-9 Polarity of Transformer Voltage

(c) (t3 — t4) Period

The energy accumulated in C is released to the deflection yoke, the direction of the current flow being shown in Figure 3-9 (c). The current increases as the voltage on C decreases, and at time t4, the voltage of C is 0, at which time the current is at maximum, which means the current flowing into the deflection yoke is also maximum. C is then charged and if a damping resistor is not connected, the energy between L and C will be reversed, which is the oscillation frequency set by the oscillator at L and C.

(d) t4 — t5 Period

At t4, the voltage of C is 0. After this it is recharged in the opposite direction and this voltage exceeds the voltage of the power source at time t4. At this time the damping diode is ON and the L and C circuits are shorted out and stop oscillating. Because of this the time constant of r and L in the damping diode is large so the current flowing in the deflection yoke does not suddenly become 0. The current shows a linear decrease, and when it becomes 0 at time t5 the transistor is ON and the operation described above is repeated.

As described above, the current flowing in the deflection yoke during scanning is the sum of the current which has passed through the transistor and the damping diode current. Please refer to Figure 3-8 (c).

4. **Horizontal output operation:**

The actual output stage differs from the simple model described in a number of ways. Refer to the basic schematic of the major components in Figure 3-10 on the following page.

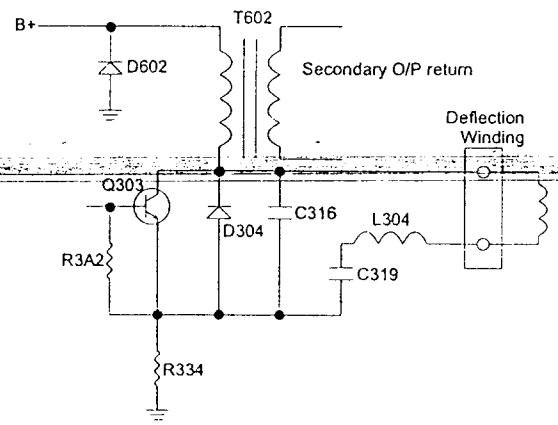


Figure 3-10 Basic Horizontal Deflection Output Circuit

The main inductance L is now divided into the primary winding of the Flyback Transformer (FBT) T602 and the deflection yoke winding. The deflecting yoke is coupled through a capacitor C319, which has two function. Primarily it prevents DC unwanted DC currents flowing through the deflection yoke which would otherwise cause an undesirable deflection of the CRT beam.

Secondly, the voltage drop across it due to the AC ramp current flowing causes a parabolic modulation in the slope of the ramp, leading to a progressive curve in the ramp, symmetrical about the zero current value as shown in Figure 3-11. This intentional distortion of the linear ramp is required to compensate for the 'S', or symmetric linearity distortion in the CRT.

In series with C319 and the deflection yoke is another indicter, L304. This is a saturating indictor that is biased with a permanent magnet.

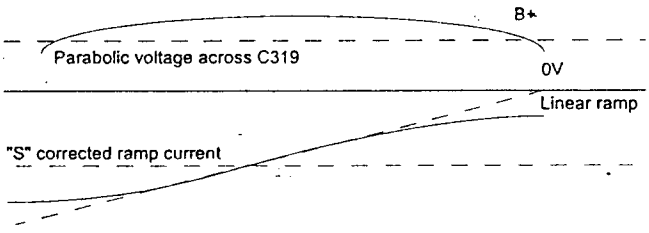


Figure 3-11 Linear Ramp Distortion

Consequently this device has a linearity that is higher for current flow in one direction than in the opposite direction. This function provides compensation for resistive losses that would otherwise cause an undesirable exponential curve to the linear ramp, resulting in asymmetrical linearity errors in the displayed image.

The voltage seen in the output stage require special attention. The B+ supply can varying between 60-180V. The main flyback pulse seen across Q303 and associated components is around 1100Vp. Consequently, appropriate precautionary measures must be taken when servicing the monitor.

In addition to the basic topology as described above, there are a number of other additional devices. Q306, Q307, Q303 and Q333 can be independently turned on or off under logic control. These devices switch addition capacitors, C320, C322, C362 and C367 in parallel with C319 to alter the amount of 'S' correction at different horizontal scan frequencies.

D308 and D309 acts as a constant current source that can be under SW301 control. This current source drives an adjustable constant current into L304. This current flows into the deflection yoke and adds a variable DC offset to allow image raster centering to be achieved.

The B+ provides current for the deflection coil (D/Y). Therefore, changes in deflection current can be controlled by modifying B+ voltage. As a result, horizontal width can be modified. In order to obtain the side horizontal width for different frequencies, a DC to DC feedback circuit is added. The synchronization signal comes from deflection output, from pin 12 of T602 to base of Q603 which drives Q604 to trigger pin 4 of IC601. Feedback signal come from secondary on T601, via D604, R611 and R612 to become a DC voltage on pin 2 of IC601, another feedback signal passes through emitter of Q303, via R606 on pin 3 of IC601. There signals determine duty cycle of output signal of IC601 which is coupled to T603 to drive Q601, to control B+, making it possible to have correct deflection current and horizontal width on different frequencies. Similarly, output pin 36 of IC801 drive through R368, C348 and R610 to control duty cycle of IC601 output to achieve horizontal width adjustment.

During mode change, the B+ supply can be instantly turned off by pulling up the error amplifier input on pin 1 of IC601. These can be achieved by Q602, Q606 and Q605 which is driven from the logic circuit pin 9 of IC801 (MUTE). Whilst Q602, Q606 and Q605 can switch off the B+ supply almost instantly, the time taken for the supply to restart is programmed by the value of logic circuit.

In addition, the B+ (200V) supply is configured so as to maintain a constant anode voltage. The anode voltage is derived from the flyback transformer T103. As the flyback voltage across the primary is already a high voltage pulse of around 800Vp, it requires only a modest turns ratio to step this pulse up to around 26kV, the working voltage of the CRT. Refer to the basic schematic of the major components in figure 3-12.

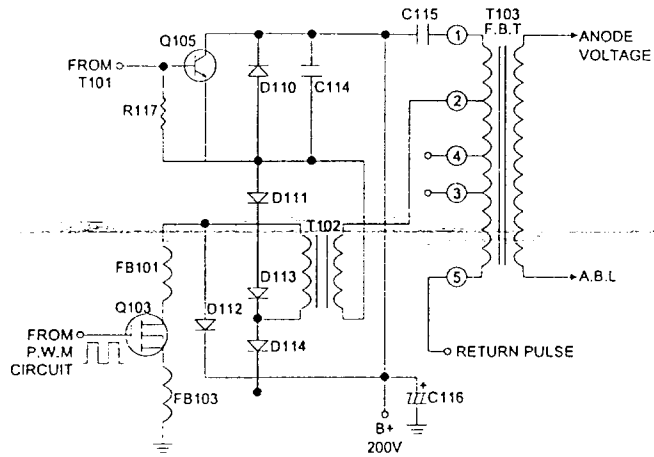


Figure 3-12 Basic High Voltage Output Circuit

The flyback pulse at the primary of T103 is proportional to the both frequency and the supply rail B+. In order to maintain the anode voltage at a constant 26kV a regulation system is required. This is achieved using a PMW regulation stage formed by a IC101 driving a Q103. The causes a regulating current on primary T102, the voltage changes in secondary T102 result in a constant high voltage, synchronized by the horizontal oscillator. The IC101 has an error amplifier that generates an error signal from the feedback network formed by the high voltage bleed resistor and capactior (it is internal to T103). Resistors VR101, R103 and R104 set the DC feedback ratio, and by adjustment of VR101, this ratio can be adjusted at setup to set the high voltage at it's nominal value of 26kV. The AC frequency response of the serve loop is set by C104, D103 and D104 for optimum stability and relegation characteristics.

The output of the error amplifier which can be observed on pin 1 of IC101 is internally compared with a DC voltage. This DC is produced across.

The average beam current through the CRT also flows through the secondary high voltage winding of T103 connected to pin 8 of T103, C132 and R138 smooths the pulse of current flowing in the secondary winding and the average DC current is supplies through resistor R137 and VR106. When the average secondary current flowing exceed 460mA, this voltage begins to drop below this threshold. Thus a signal is generated which can be fed to video amplifier for automatic beam current limiting (ABL).

3.2.8. X-RAY Protection Circuit

The feedback pulse voltage from T103 F.B.T is regulated through D302 to obtain a DC voltage and the appropriate set voltage is distributed by R323 and R324. When the feedback pulse voltage exceeds the set voltage, a DC voltage develops in the cathode of ZD302 which turns on Q304 and Q305. As a result, the pin 1 of IC306 (adj-pin) to 0V, so IC306 is turned off, putting the 12V is not output. This is the phenomenon of high voltage protection.

3.2.9. The Focus Circuit

The output waveform come from pin 16 of IC302 through C122 and R123 to the amplifier Q106, via T104 with horizontal waveform to modulation. After, the wave coupling of the T103 which make the focus performance on the C.R.T. This is waveform shown in figure 3-13.

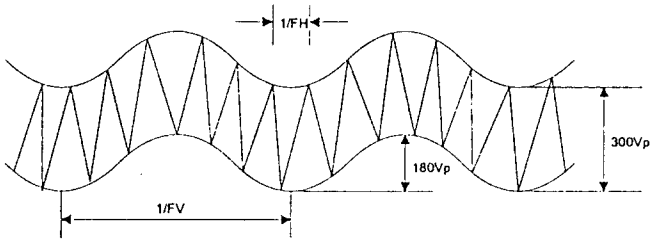


Figure 3-13 Focus Correction Wave

3.2.10. Horizontal linearity and CS Switching

Switching CS is necessary to ensure the lines are in accordance with the specifications in multi-sync monitors.

- For frequencies 69.5~85kHz, Q307 and Q333 are OFF and RL301 is ON so CS is only C319, but L304 and L305 in parallel.
- For frequencies 55~69.5kHz, Q307 and Q333 are OFF, RL301 and Q330 are ON, so CS are C319 and C362 in parallel, but L304 and L305 are in parallel.
- For frequencies 45~55kHz, Q333 is OFF, RL301, Q307 and Q330 are ON, so CS are C319, C322 and C362 in parallel, but L304 and L305 are in parallel.
- For frequencies 39~45kHz, RL301, Q330 and Q333 are OFF and Q320 is ON, so CS are C319, C320 and C322 in parallel, but linear coil is only L304.
- For frequencies 34~39kHz, RL301and Q333 are OFF, Q307 and Q330 are ON, so CS are C319, C320 C322 and C362 in parallel, but linear coil is only L304.
- For frequencies 30~34kHz, RL301is OFF, Q307, Q330 and Q333 are ON, so CS are C319, C320, C322, C362 and C367 in parallel, but linear coil is only L304.

Truth Table of Frequency Discriminator

FEQ CS	30~34k Hz	34~39k Hz	39~45k Hz	45~55k Hz	55~69.5 kHz	69.5~85 kHz
CS1	L	L	L	H	H	H
CS2	L	L	L	L	H	H
CS3	L	L	H	L	L	H
CS4	L	H	H	H	H	H

Truth Table of Power Saving Detector

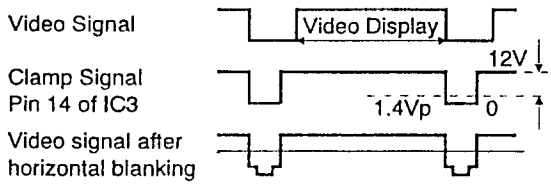
Mode	H-sync	V-sync	PMG1	PMG3	Mute	Blanking
ON	Pulse	Pulse	1	0	0	0
Standby	No Pulse	Pulse	1	1	1	1
Suspend	Pulse	No Pulse	0	1	1	1
OFF	No Pulse	No Pulse	0	1	1	1

3.3. Video Amplifier

The RGB video and sync signals are supplied through a video cable directly to the Video Board at connector P1. The RGB signals are terminated in 75 ohms by R1 and R31, R50 and R51.

The RGB signals then enter an IC3 LM1205 video pre-amplifier, providing synchronous black level clamping, variable picture contrast (gain) and RGB gain balance for alignment. Separate gain control voltages for the three pre-amplifier channels are provided via R67, R47 and R17 from the IC5 TDA8444 DAC which is loaded by the microcontroller via the I2C bus. These inputs enable the individual gains of each channel to be varied to allow channel gain balance. In addition, a common signal is applied on pin12 of IC3 to adjust all three channels by the same amount, to allow for overall gain or contrast control.

A synchronous clamping signal is derived from the horizontal sync pulse by Q2. This takes the trailing edge of the horizontal sync pulse, differentiates it through C74 and R82, which is applied pin 14 of IC3. The timing is shown in Figure 3-14.



NOTE:

A. Clamp signal is generated from horizontal sync pulse time.

B. When the Clamp signal is less than 1.4Vp-p, the IC's internal clamp loop will operate; when greater than 1.4Vp-p, it will not operate.

Figure 3-14 Timing of Pin 14 Clamp Signal

The outputs of the video pre-amplifier are fed to IC1, a hybrid power amplifier IC type VPS10S, through resistors R6, R36 and R56. In addition, on screen display video information generated by IC2 can be injected via Q5, Q6 and Q7 through R3, R33, R53 and D83, D84, D85.

IC1 amplifies the video signals to around 40Vp-p. The outputs are AC coupled to the CRT cathodes via C5, C35 and C55. In order to bias the DC level of the cathodes correctly, the AC coupled signal is DC restored by clamping to a DC voltage which can be varied under microprocessor control. Considering Red channel output on IC1 as an example, the signal is clamped by D4 to the voltage set by the transistor amplifiers formed by Q3, which amplify the adjustable voltage at the output of the DAC. A similar stage can be seen for the green and blue channel outputs.

When the RC video signal amplification circuit is added for amplification, this waveform will change as shown in Figure 3-15 (a). Without the DC component, as shown in Figure 3-15 (b), the DC level of darker and brighter displays will be different, so when this kind of signal without a DC component is sent to the CRT, it will cause the contrast of the image to change as the signal changes. Therefore Q3 and D4 serve as a DC clamp and the CRT's cathodes DC voltage can be adjusted by the IC5 TDA8444 DAC.

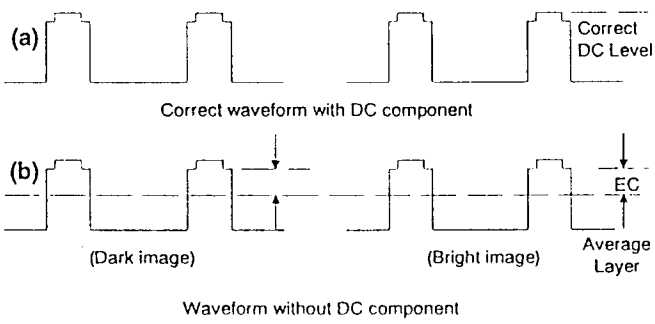


Figure 3-15 The Post Output Amplifier Circuit

IC2 is an On Screen Display processor. This is a simple video generation IC2 that has its own oscillator circuit. The oscillator circuit by using an internal Phase Locked Loop (PLL) the IC2 can sync to the incoming vertical and horizontal oscillator frequencies and produce the OSD video signals once initialized and loaded by the commands and data received on the I2C bus. When the OSD display is activated, the blanking output of the IC2 also sends a signal to the blanking input of IC3 (pin13) to provide an optional black background for the OSD display.

The RGB signals are amplified to drive the CRT by an IC1 VPS10S hybrid amplifier and capacitively coupled to the cathodes.

Brightness control is achieved by varying the bias of G1 of the CRT via a transistor stage formed by Q111 which is also driven by an output of the pin 9 of IC5. Vertical blanking signals is coupled into this amplifier Q204, Q205 and Q202 to prevent visible retrace lines.

3.4. Microprocessor And Sync Processing

The microprocessor is a MC68HC705BD3P type. It is particularly suitable as multisync computer monitor controller. This 8-bit microcontroller unit (MCU) contains an one-chip oscillator, CPU, RAM, ROM, M-Bus serial interface system (IIC), parallel I/O, Pulse Width Modulator, Multi-Function Timer and sync Signal Processor. It has a 7.75k bytes of ROM and 256 bytes of RAM on internal which contains a basic communication 'boot' routine and various other simple routines. It is also used to store the OSD icon bit map. The main firmware routines and variable data stored in the 16k external EEROM, IC802.

When the micro is instructed via the IC2 bus, the internal ROM boot routine will load up the EEROM with program data from the IC2 bus. Thus it can be made to load its own firmware. From then on it will run jointly out of EEROM and internal ROM. Another important routine within the internal ROM is the routine which allows data writes to be made to the EEROM. This must be resident in the micro as it cannot run from the EEROM whilst writing data. These control the addressing and I/O port selection from the micro CPU in the IC801 (MC68HC705BD3P).

Also specialized ports Pin16, Pin 17 and Pin18 of IC801 form the M-Bus interface which is used internally to set the DAC valuse and the OSD IC and CS table control IC (IC803). Other way, specialized ports pin 11 and pin 12 of IC801 from the M-bus interface which is used internally to set the data to external EEROM IC802. In addition, the I/O ports from pin 19 to pin 23 of IC801 from the M-bus interface which is used internally to set the front panel control.

There are 16 PWM channel. Channel 0 to channel 7 are dedicated PWM channels while channel 8 to channel 15 are shared with ports C under the control of the corresponding configuration register. Thus it can be made to control H-PHASE, PARALLELOGRM, PIN-BALANCE, TRAPEZOID, PINCUSHION, TILT, V-SIZE, H-SIZE and V-POSITION on the pin 1, pin 26, pin 27, pin 28, pin 29, pin 34, pin 35, pin 36, pin 37 and pin 38 of IC801.

The micro also drives the sync selection circuits. IC801 is used to set the polarity of the incoming sync signals and allows the micro to sample the vertical and horizontal syncs and to select the correct polarity on the outputs H-SYNC and V-SYNC appropriately. In addition, whilst sampling the polarity, the micro can measure the frequency of both syncs. By